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EDITORIAL.

Eradication of Lalang Grass.

In the past, a measure of success was attained in the suppression of lalang grass (*Imperata arundinacea*) by the cultivation of certain vigorous-growing cover crops. This method, however, was uncertain in its results, and there were, moreover, frequently objections to the employment of the particular cover crops which otherwise were suitable for the purpose. For various reasons, this method of suppression has never become an accepted estate practice, and the planter has been compelled to persist with the somewhat primitive but certainly effective method of digging out the weed and its removal by hand.

A monthly patrol would be necessary to dig out lalang grass, but when the tree crop shades the land completely, it becomes unnecessary. It may be assumed that, so far as estates are concerned, land cleared of lalang grass will be periodically patrolled and kept free of this weed.

Where time is not important, lalang grass may be killed by planting closely seedlings of *leban* (*Vitex pubescens*), a small crooked tree commonly occurring in secondary growth. It is stated in a publication by the Forest Department that lalang grass may be completely killed in five years by the overhead shade from this tree.

Whether such measures are cheaper than recurrent eradication by poisoning was outside the scope of the investigations reported upon in this number.

Mr. J. L. Greig in his article in this number on "The Use of Chemicals for the Eradication of Lalang Grass" claims that complete control of this noxious weed may be achieved by repeated spraying with a solution of sodium arsenite, at a cost considerably less than is incurred by digging out the weed.

The use of chemicals for the eradication of weeds is no innovation and the adoption of this method against lalang grass need not, therefore, be treated with the scepticism which might be accorded to an entirely new method of agricultural practice. We, believe, however, that the application of this method to lalang grass control is novel. Experiments are in hand in an attempt further to reduce costs of using sodium arsenite.

The success of the experiments described is striking and the idea should commend itself to planters who find themselves in the unenviable position of facing the problem of eradication of lalang grass.

The Sungei Manik Irrigation Scheme.

The most ambitious irrigation scheme in connexion with rice cultivation undertaken by the Federated Malay States Government since the Krian area was established is the development of an area of about 25,000 acres at Sungei Manik, Lower Perak. A brief history of this scheme and the progress to the end of 1935 was published in this Journal last year.* An interesting and detailed account of subsequent progress has recently been published in the Annual Report for 1936 of the Drainage and Irrigation Department, which is reviewed on another page.

An important aspect of such schemes as the present is the setting up of the administrative machinery, and perhaps at no time is efficient and adequate administration more important than during the initial stages of development of an area. The success of the scheme certainly pivots on the constructional work, but around this hub are such questions as settlement of the area, systems of planting, health, transport, village-planning, finance, and protection from wild animals. The Government Departments concerned with these various duties must be co-ordinated to ensure settlement of a contented population, and the financial success of the scheme. The District Officer, Lower Perak, as the administrative officer, has effected this liaison and has also brought the colonists into touch with the Government through an Advisory Committee and the Mukim Council.

Recently, we were privileged to read the 1936 annual report on the Sungei Manik Scheme, written by the District Officer, Mr. J. Innes Miller. Such reports as this are written mainly for administrative use, and, in their original form, do not usually see the light of day. Of particular interest is the account which Mr. Miller gives of the organization of administration which has been developed by him and his predecessor (Mr. G. A. de C. de Moubray), to enable the excellent pioneer work of the Drainage and Irrigation Department to reach fruition. With the permission of the Perak Government, therefore, we have abstracted portions of Mr. Miller's report which we publish in this number under the title, "The Colonization of the Sungei Manik Padi Irrigation Scheme".

The account here given is of more than passing interest; it is a record of an achievement which may well serve as a model and a guide to be followed in future developments of a similar nature.

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* The Sungei Manik Irrigation Scheme, by G. A. de C. de Moubray, *Malayan Agricultural Journal*, Vol. XXIV, No. 4, April, 1936.

Original Articles.

THE USE OF CHEMICALS FOR THE ERADICATION OF LALANG GRASS

BY

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Introduction.

Chemicals have been in use for many years in temperate regions, where labour is expensive, as a means of controlling noxious weeds in places such as paths and railway lines. Latterly, the practice has been developed and adapted for use on arable and pasture land, a somewhat more complicated process because, while it is desired to poison some obnoxious plant or insect pest in the soil, the land must not be rendered toxic to any succeeding agricultural crop.

In Malaya, when land becomes infested with lalang grass, *Imperata arundinacea,* the satisfactory growth of any agricultural crop in the same area becomes a practical impossibility. This is owing to the condition of intense competition created by the matted plexus of long creeping subterranean rhizomes from which emerges above the soil a dense foliage of linear acuminate leaves from 2 ft. 6 ins. to 4 feet in height. Up to the present the usual method of eradication has been to dig by hand at a cost of from $40 * to $50 per acre. It is essential, when this method is employed, that every scrap of rhizome should be eradicated and destroyed, owing to the facility with which shoots are produced, giving rise to new plants.

To reduce the cost of eradication, the use of chemicals suggested itself. Where land occupied by a tree crop, such as rubber or certain fruit trees, has become infested with lalang grass, chemicals can be conveniently applied to the lalang underneath while avoiding the crop overhead. An advantage of chemical treatment over eradication by the accepted method of digging is that the latter would probably result in severing and wounding many roots of the tree crop.

Several other methods are employed with the object of suppressing lalang grass. Some success has been obtained by establishing clumps of *Mimosa invisa* from seed, which under favourable condition grows over the lalang and to some extent suppresses it. *Mimosa invisa* has become unpopular owing to its prickly stems causing harm to the bare feet of labourers.

Experiments have been made with a number of trees in order to ascertain whether trees will grow amongst lalang and suppress it by overhead shade. *Vitex*

* $1 Straits = 2 shillings 4 pence.

pubescens (*leban*, Malay) has proved satisfactory but takes from 4 to 5 years to overcome the lalang grass below it (5). This method, therefore, is ordinarily too slow for general practice.

First Experiments.

The first experiment in the control of lalang by chemicals at the Central Experiment Station, Serdang, commenced in August, 1935. The site selected consisted of an area of undulating lateritic quartzite soil covered with a dense stand of lalang about 3 feet tall, through which a few seedlings of jungle trees were struggling to establish themselves. There was no crop occupying the land.

After the jungle saplings had been removed the area was divided into small plots of 1/80th of an acre each to which the following range of treatments was applied on the lalang as it stood:—

Treatment No.	Treatment.	lbs per acre.
1.	Sodium arsenite	5
2.	Sodium arsenite	10
3.	Sodium arsenite + ...	5
	sulphuric acid, concentrated	15
4.	Sodium arsenite + ...	10
	sulphuric acid, concentrated	15
5.	Sodium chlorate	14
6.	Sodium chlorate	28
7.	Arsenic pentoxide	5
8.	Arsenic pentoxide + ...	5
	sulphuric acid, concentrated	15
9.	Seeds of *Mimosa invisa* sown throughout the lalang.	

With regard to Treatment No. 9, from time to time *Mimosa invisa* has been advocated as a means to eradicate lalang. It is a strong growing cover crop which has a tendency to smother any plant with which it may come in contact. It was included in this experiment for comparison with chemicals, but under the conditions obtaining at the Central Experiment Station it was entirely unsuccessful.

A duplicate series of plots was laid out in which the lalang was slashed back tc ground level.

The chemicals were dissolved in water to make a solution of sufficient volume to cover a plot, and were sprayed from a four-gallon sprayer of the knapsack type, the application being delayed until the new shoots attained a height of about 18 inches.

The first effect of spraying was that the portions of the plant above ground level, wherever the poison had established contact, turned an unhealthy brown

colour and died back. Some leaves would go brown and die off over their entire length, while others would be only slightly affected.

Spraying was repeated at intervals of 25 to 35 days until April, 1936, when it became apparent that, while certain poisons, notably sodium arsenite and sodium chlorate, had a marked effect on the growth of lalang, rejuvenation was so vigorous that the total number of sprayings that would be necessary to produce control would be uneconomic. Accordingly in January, 1936, the whole experiment was simplified and restricted to Treatments 2 and 4 consisting of sodium arsenite with and without concentrated sulphuric acid on unslashed lalang. As rejuvenation after spraying had been so vigorous and rapid it was decided to reduce the interval between sprayings to coincide with the approximate time required to produce the maximum effect of the poison; this period is about 7 days. The result aimed at was that, just as the lalang was at its sickliest after one application and before there were any signs of recovery, the next succeeding application of poison would begin to take effect and so on with every succeeding application. It was thus hoped to build up a series of rapid cumulative shocks that would prove fatal. That is actually what happened. Commencing in May eight sprayings at intervals of seven days resulted in the death of the pest and up to the time of writing, nine months later, there has been no regrowth. The plots are now covered with a growth of self-sown grasses and jungle seedlings, thus demonstrating that the poisons do not render the soil inimical to plant growth.

With regard to the two treatments employed it was found that the addition of concentrated sulphuric acid does not result in any more rapid or complete eradication than that effected by the sodium arsenite alone.

Second Series of Experiments.

Following the encouraging results obtained on small plots in Block 3 a somewhat larger scheme was embarked upon commencing in September, 1936, in which the scope of these investigations was extended to two types of soil with two types of treatment.

Block 14. The soil in this area is a heavy valley quartzite containing from 50 to 70 per cent. clay fractions. The site is level and low-lying, though adequately drained, and was supporting a dense growth of lalang, 3½ to 4 feet high. An area of a quarter of an acre was selected for experimental purposes. The few jungle trees on the plots were allowed to remain to serve as indicators should the concentration of poisons in the soil became so high as to cause the trees to show signs of having absorbed poisons through their roots.

The plot was divided into four sub-plots, two of which were slashed and then sprayed for the first time when the young shoots were about 1 foot high. On the remaining half the lalang was sprayed as it stood. The attached plan shows the lay-out of the experiment together with the treatments.

Block 14.

.....$2\frac{1}{2}$ chains.....

Sodium chlorate Unslashed.	Sodium arsenite Unslashed.
Sodium chlorate Slashed.	Sodium arsenite Slashed.

.....1 chain.....

TREATMENTS.

(1) Sodium chlorate applied in a solution at the rate of 28 lbs. per acre per application. This is the same treatment as No. 6 in the previous experiment.

NOTE.—This treatment was persevered with although it had not been successful in the previous experiment. It is a very popular weed-killer in temperate regions, one of its great advantages being that it does not leave any harmful residues in the soil which are both stable and poisonous. It is, however, highly inflammable.

(2) Sodium arsenite applied in a kerosene emulsion * at the rate of 10 lbs. of the salt per application. In this experiment it was not considered necessary to use concentrated sulphuric acid, but the salt was conveyed in a kerosene emulsion so that its wetting power would allow of a more even distribution of the chemical on the lalang leaf. It was not possible to do this with the other treatment as sodium chlorate is too active a compound to be compatible with a kerosene emulsion.

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* KEROSENE EMULSION.

The emulsion is prepared as follows:—

Materials required:

Kerosene	...	2 gallons
Soft soap	...	1 quart
Water	...	1 gallon

Method.

The soap is dissolved in the water by boiling, and immediately added, while hot, to the kerosene (away from the fire). The whole mixture is then agitated violently while hot by pumping it back on itself with a force pump and a direct discharge nozzle throwing a strong stream, preferably one eighth inch in diameter. After from two to five minutes pumping the emulsion should be perfect and the mixture is increased from one-third to half in bulk and has assumed the consistency of cream. Such an emulsion keeps indefinitely. The formula is taken from Boucart's "Insecticides, Fungicides and Weed-killers". The stock solution was then diluted with 15 times its volume of water and the sodium arsenite added. The solutions were applied by means of an ordinary knapsack sprayer with a capacity of 4 gallons.

HEAVY STAND OF LALANG AT BEGINNING OF EXPERIMENT. BLOCK 14.

THE SAME AREA AFTER TEN APPLICATIONS OF SODIUM ARSENITE.

The first application of chemicals was on the 7th September and was repeated at seven-days intervals. As this coincided with the commencement of the wet season much rain fell on the plots throughout the time that the experiment was in progress. In both the slashed and unslashed sub-plots to which sodium arsenite was applied the effects were rapid, and after five sprayings most of the lalang was dead. In small raised patches of ground where rain was washing away the sodium arsenite, there was a certain amount of regrowth and all shoots had not died until the 9th or 10th sprayings. The use of the kerosene emulsion did not appear to render the effect of the sodium arsenite any more decisive, while it was evident that rain on the plots enabled the lalang to live longer. During the interval between the 1st and the 10th sprayings, a period of 64 days, 19.64 inches of rain were recorded.

The plots which were treated with sodium chlorate exhibited a check after every application, but recovery was so strong that control was not achieved. Rain again appeared to be a factor in reducing the effect of the chemical.

In no plot did the jungle trees show any sign of poisoning by either sodium arsenite or sodium chlorate.

Block 3. Concurrently with the above experiment, spraying was carried out on two half-acre plots of lalang in Block 3, an area of undulating quartzite soil through which was growing the tree *Hydnocarpus wightiana* planted in rows 40 feet by 20 feet. Here the soil was not as good as on Block 14 and consequently the growth of lalang was neither so dense nor so tall. No slashing was done and the same two treatments of sodium arsenite in a kerosene emulsion applied at the rate of 10 lbs. per acre per application, and sodium chlorate in solution applied at the rate of 28 lbs. per acre per application, were used.

In this experiment, nine or ten applications of the chemicals brought about control with both treatments. The *Hydnocarpus wightiana* foliage suffered where chemicals had actually made contact, but the general health of the trees did not suffer.

Before commencing spraying operations the dangerous nature of the solutions with which they were working was impressed upon the operating labourers and they were allowed sufficient time in which to wash themselves thoroughly before meal times and at the conclusion of each day's work.

Costs.

The cost of the sodium arsenite treatment which successfully eradicated lalang in both Blocks 3 and 14 is detailed below:—

Item.	Details.	Cost per acre.
1.	10 applications of sodium arsenite at 10 lbs. per application = 100 lbs. @ $15 (Straits) per cwt.	$13.30
2.	Kerosene and soft soap to make sufficient emulsion for 10 applications	14.20

Item.	Details.	Cost per acre.
3.	Labour charges for preparing and spraying ...	8.00
4.	Final eradication by digging of any living shoots that remained	.40
	Total ...	$35.90

It is considered that the use of kerosene emulsion is unnecessary and without it a considerable saving in costs would be effected.

Owing to the fact that the trials were conducted on small plots, calculated costs per acre are necessarily high. When carried out on a larger scale, it is probable that costs might be considerably reduced.

The cost of the sodium chlorate treatment which successfully eradicated lalang in Block 3, where the ground is undulating and the growth not so dense, but which was unsuccessful in Block 14, is as follows:—

Item.	Details.	Cost per acre.
1.	10 applications of sodium chlorate at 28 lbs. per application at $19 (Straits) per cwt.	$47.50
2.	Labour charges for preparing and spraying ...	8.00
3.	Final eradication by digging of any shoots that remained	.40
	Total ...	$55.90

This figure is more than the cost of eradication by digging, but it is proposed to persevere with this chemical in future experiments, especially when the programme of spraying is to be carried out during the dry season.

Summary and Conclusions.

Under the conditions obtaining at the Central Experiment Station, Serdang, the successful control of lalang has been accomplished during both the wet and the dry seasons by means of repeated sprayings with sodium arsenite at short intervals in which each application consisted of 10 lbs. of the salt per acre. The concentration of the solution was kept as high as possible, about 55 to 60 gallons being necessary to spray one acre efficiently with the apparatus available.

Detailed costs are given and there appears to be no reason why in the future, benefiting from past experience, these costs should not be considerably reduced. Under suitable conditions an estimate of $25 per acre seems possible.

Sodium chlorate has neither proved itself as effective nor as economical as sodium arsenite and pending further investigations its use in eradicating lalang cannot be recommended.

Acknowledgments.

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THE ADMINISTRATION OF THE SUNGEI MANIK PADI IRRIGATION SCHEME

BY

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The object of the Sungei Manik Padi Irrigation Scheme is to provide a settlement for Malays for the cultivation of rice. It is a long-range scheme, still emerging from infancy, covering some 25,000 acres and a period of 10 years of which seven have still to run. The whole area has to be won from a vast jungle swamp, and the water diverted to the practical use of irrigation. Landless men are found land—the population is already 5,000—and Malaya is given a valuable addition to its food supplies. The scheme provides, both in its initiation and its maintenance, an organized co-operative effort of the highest interest. A report on the scheme and its progress to-date by Mr. G. A. de C. de Moubray of the Malayan Civil Service, then District Officer, Lower Perak, was published in 1936.* The present account may be considered as a continuation of Mr. de Moubray's article, summarizing the progress of the development of the area during 1936, and emphasizing in particular the methods evolved in its administration.

The Sungei Manik area is situated in the District of Lower Perak, along the branch road that connects Teluk Anson with the main trunk road at Kampar, and along the branch railway line that connects Teluk Anson with the main railway system at Tapah Road Station, at a distance of about 20 miles in each case.

The principle of development has been to prepare areas for colonization in independent but complementary units which dovetail to form the complete scheme. There are five stages in the scheme, of which the 1st Stage was completed in 1935, while the 2nd Stage was developed in 1936. A commencement with the development and colonization of the 3rd Stage will be made in 1937. It is unlikely that the 5th Stage will be reached before 1942-43.

The Sungei Manik area forms a large triangle, at the apex of which it is proposed to construct the permanent head-works, with main canals down both sides to provide irrigation water, and with parallel drainage towards the base of the triangle.

During 1936, 2,046 acres were alienated, making a total of 6,494 acres, of which 4,479 acres were planted. The objective to be aimed at when the scheme is complete is about 20,000 acres planted, which should give about 14,300 tons of rice.

External communication is provided by rail, road, various rivers, and a direct bridle-path from Teluk Anson constructed for the purpose, and internal communication by bridle-paths along the tops of the banks of all irrigation canals, distributaries and drains. Within easy reach on one side is Teluk Anson, a market town

* *Malayan Agricultural Journal*, Vol. XXIV, No. 4, April, 1936.

Sungei Manik Irrigation Scheme (2nd Stage).
Main canal, distribution control and distributary canals at Chikus.

SUNGEI MANIK 2ND STAGE CANAL:
Lateral weir type of drop. The drop planks have been removed to empty the canal.

and District Headquarters; on the other side are forests where jungle produce and building material can be obtained. The whole area, excluding at present the 5th Stage or Forest Reserve, is a single *mukim* created for this purpose, with a Colonization Officer holding the rank of an Assistant Collector of Land Revenue, a separate headman (Penghulu) appointed by Government, four Ketuas elected by the people, and a Mukim Council. Steps were taken during the year to have the area created also a Malay Reservation and an Irrigation Area, covering in both cases the entire Mukim.

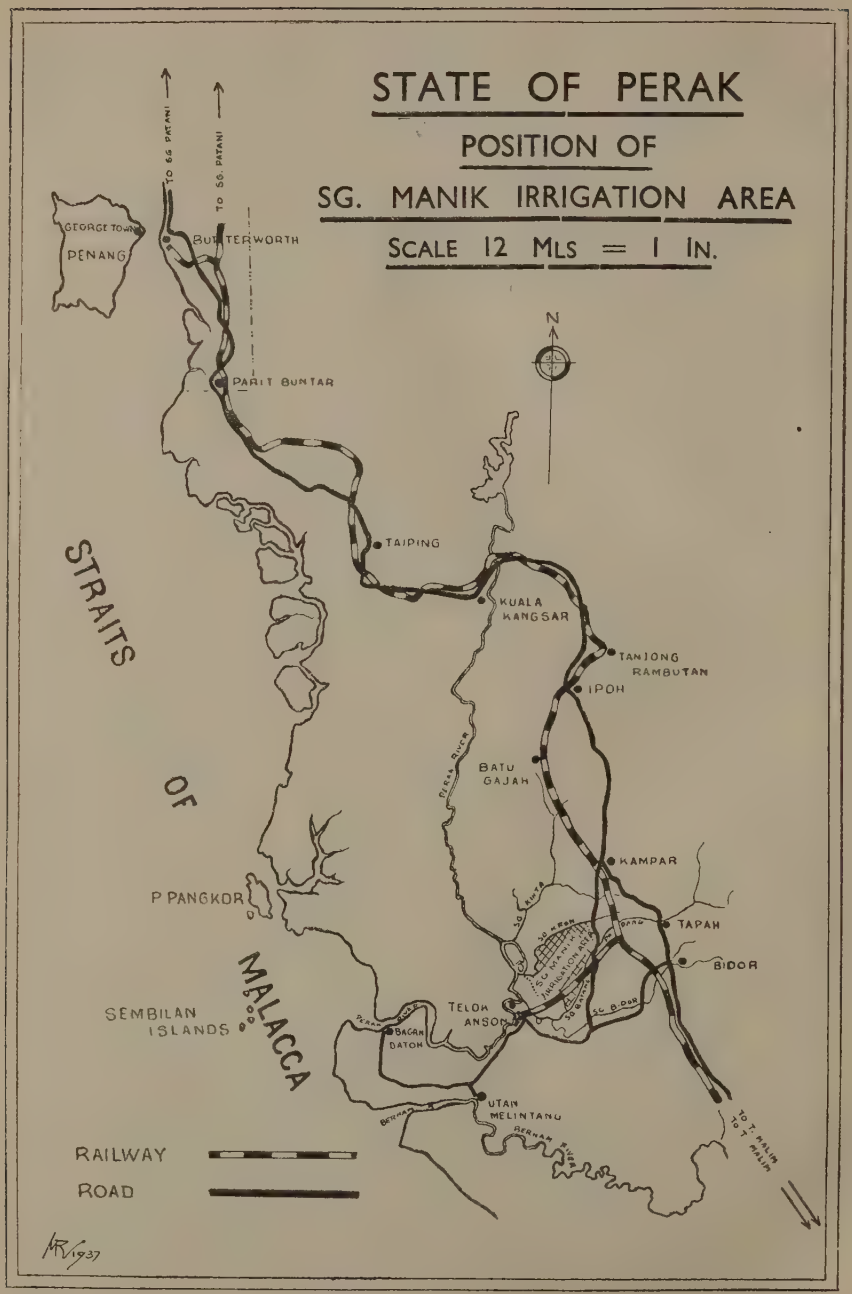
There is a Padi Experiment Station of 58 acres under the Department of Agriculture, and near the 2nd Stage intake an experimental fish-breeding pond under the Fisheries Department. The Department of Agriculture sells to the planters padi seed and for fruit tree grafts at cost price, and gives demonstration lessons on the spot. The new settlers have a special officer, the Colonization Officer, to put them on to their land and help them to surmount initial difficulties.

There is a staff of subordinate Agricultural and Drainage and Irrigation Officers living on the spot to deal immediately with any matters which may arise. A special Advisory Committee, under the chairmanship of the District Officer, of which the Raja Muda, Territorial Chief, Penghulu, and Colonization Officer, are members and on which all interested Departments are represented, meets periodically during the year to co-ordinate all matters affecting the area. There is also the Mukim Council, under the chairmanship of the Colonization Officer, of which the leading residents are members, for the consideration of local affairs and the putting forward of ideas to the District Officer. It may be claimed, therefore, that reasonable provision has been made for the welfare of the colonists, and for the progressive development of the scheme.

Administration.

The Government Departments at present principally concerned are the Department of Agriculture, the Drainage and Irrigation Department, and the Land Office. The Agricultural Officer is responsible for the crop. He gives assistance and distributes seed. In conjunction with the Drainage and Irrigation staff, he sees that the prescribed dates for planting nurseries, preparing the rice fields and transplanting from nurseries are observed, that diseases and pests are checked, and that the harvest is duly collected and yields measured. He is in charge of the Padi Experiment Station where demonstrations are given and different kinds of seed, long and short term, are tried out. He also advises as regards catch crops such as dry padi and maize, while the land is being cleared, and with the cultivation of *rambai* and *mengkuang* in the river reserves. He assists the Land Office in the preparation of the land, as for instance by helping to organize a good burn. The Agricultural Officer also assists the Drainage and Irrigation Engineer with regard to the best dates for the supply and withdrawal of irrigation water. He has two subordinate officers immediately concerned with Sungei Manik, one of whom is resident in the area. He is a member of the Advisory Committee.

The Drainage and Irrigation Engineer is the officer in charge of all construc-


STATE OF PERAK
POSITION OF
SG. MANIK IRRIGATION AREA
SCALE 12 MLS = 1 IN.
TO 66 PATANI
TO 56 PATANI
GEORGE TOWN
PENANG
BUTTERWORTH
PARIT BUNTAR
N
TAIPING
KUALA KANGSAR
TANJONG RAMBUTAN
IPOH
BATU GAJAH
PERAK RIVER
KAMPAR
TAPAH
BIDOR
P PANGKOR
STRAITS OF MALACCA
SEMBILAN ISLANDS
TELOK ANSON
BAGAN DATOH
UTAN MELINTANG
BERNAM
BERNAM RIVER
TO T. MALIM
RAILWAY
ROAD
1937

tional and maintenance works within the area. No drain or pit can be dug, or bund constructed, without his consent. He controls the irrigation water and the drainage, maintains the paths and streams, designs the lay-out, and surveys the lie and quality of the land for future stages. The encircling bund, which protects the area from flooding and provides a road dry at all seasons, is made by a dragline excavator, worked by Malay and Chinese mechanics who are under his control. These mechanics have now attained in operating the machine a high standard of skill which is said to compare favourably with the standard achieved by the crews of similar machines in England. Digging conditions at Sungei Manik are made very difficult by the presence of swamp and jungle, yet the output of the machine is well up to, and at times above, the manufacturer's guarantees for working in England. Within this bund are the canals, distributaries and drains, each controlled by separate intakes and outlets, so that the whole operates, in conjunction with the seasons, as a single harmonious scheme. While construction must set the pace, colonization and the planting seasons must be kept in view. The resident staff at present consists of a Senior Irrigation Inspector, six Patrol Watchmen, four labour maintenance groups, and task-work labourers employed on various jobs. The Drainage and Irrigation Engineer is a member of the Advisory Committee.

The Land Office, of which the Collector is the head, is responsible for the demarcation of lots within the Drainage and Irrigation Engineer's plan, the selection of colonists, the placing of them on the land, the collection of land revenue, the registration of titles, the dates for felling, burning, clearing and "batasing"*, the enforcement of the laying out of nurseries, and of cultivating and planting at fixed dates, the acquisition of land where necessary for public purposes, and the resumption of land which is not duly cultivated. The Collector's officers are the Colonization Officer and the Penghulu, of whom the former lives in the area and the latter will do so when the house to be built for him this year is completed. The Collector maintains touch with the people through the *Ketua² Bendang,* their elected representatives, and communicates the instructions of Government to them through the Penghulu. Land policy is one of "post survey"; that is, to give out holdings for the first two years under temporary occupation licence, and not to issue a permanent title until the colonist is proved worthy. There are 4,219 acres already held on permanent title, out of a total available of 8,023. Land revenue is derived from a licence fee amounting to $1 per acre a year, or from quit rent at $1 an acre where the land is on permanent title. Water rate is payable under the Irrigation Areas Enactment after the first irrigated harvest, and for the first year at half rate, but in Sungei Manik, where all the lands have been opened up directly from jungle, the present ruling is that there should be three irrigated harvests before water-rate is collected, and then only at half-rate for the first year. No rates have yet been charged, but an Assessment Committee has been appointed

* Batas (Malay) = narrow earth embankments on rice fields constructed for the purpose of retaining and distributing the water in the area.

to recommend the classification of lands and the fixing of rates for this purpose. The Collector (who is also the Assistant District Officer) is a member of the Advisory Committee.

Other Departments concerned which have assisted in the scheme are the Co-operative Societies, Education, Fisheries, Forest, Game, Health, Medical, Public Works, and Railways. Steps have been taken to form a General Purposes Co-operative Society when the people have become more settled. A school built by the colonists was supplied by the Education Department with a teacher trained in domestic crafts, and two new schools with teachers' quarters will be built and staffed by Government this year. The Fisheries Officer has superintended the stocking of two experimental fish-ponds, one of stagnant water and the other of fresh, with different species of indigenous Malayan fish for transfer to the canals and rice fields, *lampam* and *terbol*—two species of river carp—and *tembakang* and *kalui*, air-breathing fish of a high quality, both for food and as an additional source of income. The rice-growing area was stocked in 1935 from Krian with fry of the padi fish, originally introduced into Malaya from Siam, and known as *Sepat Siam*. This fish has bred rapidly; there was a great increase in the quantity in Stage 1 during 1936, and the marketing of it has proved a valuable source of revenue. The Forest Department arranges for exploitation of timber in areas prior to settlement and has undertaken the control of firewood and river reserves. The Game Department assists with the protection of the area from elephants.

The Health Officer has made two anti-malarial surveys to investigate the possibility of malarial outbreaks due to leaving river banks under jungle. He has advised the filling up of old channels, and has tested wells. He has also suggested experiments with trapping rain water. The question of the introduction of a purified water supply, either in tanks or by pipe line, was considered by the Committee and will be explored further during this year in consultation with the Executive Engineer. The Health Inspector has visited the area once every two months. The Health Officer is a member of the Advisory Committee.

The Medical Department has assisted by sending a Dresser monthly to give treatment for any form of sickness reported to him. The Public Works Department completed the construction of the bridle path from Teluk Anson (Kuala Bidor) to the end of the old Sungei Manik drain. This is greatly used by the public. The Executive Engineer has also been good enough to arrange for the building of the two new schools for 1937. He will be more actively concerned in the scheme when metalled roads and a water supply are added.

The Railway Department arranged an additional halt, to supply the eastern half of Stage 1, at Sungei Kerawai, and lent a godown free of charge during the 1935-36 harvest for the storage of padi purchased by the Government padi-buying agency. At the end of the year, at a meeting between the Traffic Assistant, the Drainage and Irrigation Engineer and the District Officer, on the subject of the siting of railway stations, it was agreed that the provision in the 1938 estimates for a shelter and platform for passengers at Chikus halt, and, in the 1939 estimates, for the addition of siding accommodation to hold say six wagons, might be consider-

THE SUNGEI LAMPAM BUND.

ed. Chikus, it is interesting to note, was originally designed for a station with siding; the population, however, drifted away owing to the deterioration of the land by flooding. Now, thanks to the protection offered by the bund, the people are returning, and Chikus promises to become one of the principal points of entry into the area.

The District Officer is responsible for regional planning, for co-ordinating the efforts of the other Departments, for presiding over the Sungei Manik Advisory Committee, and for maintaining the necessary touch between Government and the colonists. It is also his duty to intervene, if called upon, in any exceptional circumstance which may arise.

General policy is designed by the Sungei Manik Irrigation Area Advisory Committee. The members are the District Officer, who is Chairman, the Raja Muda of Perak, the Assistant District Officer, the Drainage and Irrigation Engineer, the Agricultural Officer, the Health Officer, the Malay Co-operative Officer, the Orang Kaya Kaya Laxamana as Territorial Chief, the Colonization Officer, and the Penghulu. The Committee met four times during 1936. The proposals of the Committee are later discussed by the State Drainage and Irrigation Board, whose members are the Secretary to Resident, the Senior Drainage and Irrigation Engineer, the State Agricultural Officer, the Warden of Mines, and all District Officers affected by drainage and irrigation schemes. Irrigation proposals have therefore been carefully examined before being submitted to Government for approval.

The Mukim Council deals in an advisory capacity with the local affairs of the mukim. Its members are local residents: the Colonization Officer (as the Senior Officer) Chairman, the Penghulu, the Irrigation Inspector, the Malay Agricultural Assistant and Malay Agricultural Subordinate, all Ketuas and the Senior Teacher.

Finance.

The capital cost of construction to the end of 1936, over a period of 5 years, excluding salaries of senior officers, has totalled $246,888. The annual cost has increased from year to year as the scheme has expanded, the cost in 1936 being $80,859. This included $12,000 for the purchase of the excavator which had previously been worked on contract, and $3,500 for quarters for the Irrigation Inspector. The average annual cost of maintenance over the last three years has been $8,100. As the area increases, the cost of maintenance increases and this charge in 1936 was $9,988. The total area available in 1st and 2nd Stages at the end of 1936 was 8,023 acres which gives an average annual cost for maintenance per acre of $1.25. The capital cost per acre, taking the 1st and 2nd Stages only, thus works out at $30.77.

FOURTEENTH MALAYAN EXHIBITION

BY

H. L. BARNETT.

Assistant to Agricultural Economist.

The Fourteenth Malayan Exhibition, organized by the Malayan Agri-Horticultural Association, was held in the Association's grounds at Kuala Lumpur during the August Bank Holidays, the 31st July, 1st and 2nd August, 1937. The organizers were again fortunate in having fine weather throughout the three days of the Show. The total paying attendance was 25,966, and 9,412 entered with free passes. The corresponding figures in 1936 were 24,700 and 22,200 respectively. The total number of visitors in 1935 was 30,036, and 22,588 in 1934.

An additional permanent building has now been erected by the Association, and the general lay-out of the Exhibition benefited considerably from the better accommodation available, it being necessary to house only the Horticultural and Poultry Sections in temporary buildings.

The Agricultural Section was transferred to the new permanent building, and the Department of Agriculture and the Rubber Research Institute of Malaya staged their exhibits in the main building instead of in a separate wooden shed as formerly.

The Opening Ceremony.

The Exhibition was honoured by the presence of H.E. Sir Shenton Thomas, High Commissioner for the Malay States, who declared it open on the morning of the 31st July in the presence of a distinguished gathering which included Lady Thomas, H.H. The Sultan of Selangor, the Raja Muda of Selangor, the Raja Bendahara of Selangor, the Raja Muda of Perak, and the Hon'ble the British Resident, Selangor.

Dato F. W. Douglas, President of the Malayan Agri-Horticultural Association, in calling upon His Excellency to open the Exhibition, paid a tribute to Government's generosity in restoring the proportion of the annual grant, cut during the years of the depression, which had permitted the construction of the new permanent building. Dato Douglas drew attention to the important work of the Drainage and Irrigation Department which, he implied, did not receive sufficient publicity, and suggested that large scale models would permit of fuller appreciation of the valuable results achieved.

His Excellency Sir Shenton Thomas spoke as follows:—

> "I think it will be admitted that the Fourteenth Malayan Exhibition opens to-day in auspicious circumstances. Two years ago, when I had the privilege of addressing you, I ventured to suggest that the progress of the scheme for rubber regulation gave hope for the future. We can say now that the scheme is a success. Stocks have been reduced to reasonable proportions and the average price last year was higher than anyone would have dared to predict. It is true that recently the market has been dull, but the fall in price of many other commodities has been as great if not greater, and I see no reason for thinking that the setback is more

than temporary. I may say, too, that I can find no real grounds for believing that, given the continuance of the existing quota, Malaya will be under-produced at the end of the year.

Estates are spending much money and thought on improvements, and the re-planting of considerable areas is being undertaken. The cost of production is being carefully watched.

Small Holdings.

On the small holdings, the upkeep continues to improve, and the quality of much of the product is now excellent. You will be able to see this for yourselves when you go round the rubber exhibits. Some of the small-holders' exhibits compare very well with good estate rubber, and the work done in supervising and explaining by officers of the Agricultural Department and by the Asiatic Instructors trained by the Institute of Rubber Research is invaluable.

I commend to your notice also the padi exhibits. As you know, the winning samples in the All-Malayan Padi Competition, organized by the Malayan Agri-Horticultural Association working in co-operation with the Department of Agriculture, are entered for competition and the standard attained is high. It may interest you to know that, whereas in 1929-30 the area under padi (both wet and dry) was approximately 657,000 acres and the production 152,500 tons, in 1935-36—the last available figures—the area was approximately 725,000 acres and the yield was 325,5000 tons. That is to say, in six years the crop has been more than doubled although the additional acreage planted has been comparatively small. The increase in the crop is due to the gradual change-over from dry padi to wet padi, to more efficient water control, and to the extended use of improved seed. But there is still much to be done. The imports of white rice alone were greater last year than the whole of the local crop.

There has been a real advance in the quality of copra produced by small-holders and by those who cure the nuts which they buy from small-holders. This is very largely due to the work of the Agricultural Department which was mentioned last year. The new type of kiln has, on the whole, been most satisfactory, but experiments are still being made to improve it. On the other hand, the scheme for grading under the Mark system has had to be dropped. The trade in copra in the world's markets is, so I am told, peculiar in that there is almost a complete absence of machinery for fixing the price ultimately received by the seller in any exact accord with the quality of his produce. But, because the Mark Scheme is not feasible, it does not follow that there is no need for improving the marketing of copra and no possibility of doing so; and the Government will investigate other methods.

Pineapples.

Pineapples are another product in which the Mark Scheme system has made but slow progress. The packers and exporters have agreed on all the major points, but much delay has occurred in settling details. This is unfortunate, because some scheme for the reliable grading of Malayan pineapples is essential. The English market for the cheap tin, which has hitherto been able to absorb most of the Malayan trade, appears now to be reaching saturation point, and other markets will have to be sought. And, I would add, other markets in countries possessing a more certain climate than we suffer at home, because I read the other day that owing to the cold summer of last year the demand for tinned pineapples in England fell off considerably. Now, in seeking new markets it is essential that the quality of the article offered for sale should be exactly what it is stated to

be. A cheap article need not be of high quality, but it must be of reliable quality. If, therefore, the Government should fail in its efforts to obtain the full co-operation of the packers in a voluntary grading scheme (and I sincerely hope we shall not fail), then we shall have to consider the introduction of a compulsory grading scheme.

New Crops.

Then as to new crops. It has always been the declared policy of the Malayan Governments to try and lessen the agricultural dependence of this country on rubber. The policy is not only a form of insurance, but to-day—in the conditions imposed by rubber restriction—it is also one of developing the land. There is still much good land in Malaya which might well be opened up.

There are several crops of which it might be possible to say that they might prove profitable to estates, but there are only two of which it is possible to say that the Agricultural Department has tried them out on an estate and has been able to prove that they are profitable for estates. These two crops are oil palms and tea.

In regard to the former, some two or three years ago, in the worst of the slump, the Vegetable Oils Committee advised against any extension of oil palm planting. Whether that recommendation had been made or not, no one would have considered the opening up of new estates during the slump, but the Adviser on Agriculture informs me that to-day he sees no reason why the area under oil palms should not be increased. His Department considers the industry a profitable one and that it is at least as sound an investment as any non-restricted crop. Mr. Faulkner adds that, even at the worst time of the slump, estates were carrying on at no very serious loss, and there are few heavily capitalized industries of which this can be said.

Tea and Restriction.

Tea is subject to restriction, and it has been suggested that by joining in the scheme of restriction the industry in Malaya has been held back. I think that any slowing down of development was due, not to participation in the scheme, but to the fact that negotiations took an unduly long time and that while they were taking place it was not possible to alienate fresh land for tea planting. When you are negotiating on such a matter, and the basis of calculation is the area of land alienated on a certain date, it is obviously not possible to include land alienated subsequently. In point of fact, all the land which may be alienated in Malaya for tea cultivation during the present agreement, which expires on March 31st next year, has not yet been alienated: but, nevertheless, in any negotiations for a continuance of the agreement we shall press for a much larger area so that this promising industry may not be seriously harmed.

Peasant Crops.

Turning now to peasant crops, we seem to have relied too much in the past on rice and rubber. But the Agricultural Department is of opinion that there is a number of other crops which peasants and small-holders can grow with profit to themselves, and in future more attention will be given to the economics of such crops. I hope that the various Administrations will assist the Department in this. Malaya is most fortunate in that its agricultural production is not wholly in the hands of estates, nor wholly in the hands of the peasant. It is the simultaneous development of both kinds of agriculture that makes for the good of a country

Cameron Highlands.

A few words about the Cameron Highlands. The Adviser on Agriculture thinks that various citrus fruits, such as grape fruit, oranges, and lemons, show promise of being successful. The tree tomato grows profusely, so does the dwarf banana. There is of course a big demand for fresh vegetables and high-class flowers. The Agricultural Department proposes, therefore, to rent some 10 acres in the Renglet area which, together with the Tanah Rata Experiment Station, will enable the cultivation and marketing of possible crops to be undertaken more thoroughly than in the past. Meanwhile, I would invite your attention to the exhibit of Highlands produce which is as good and as comprehensive as usual. And perhaps I may add here that the amenities of the Highlands are being steadily improved, partly by the successful introduction of trout into the streams—we hope that before very long fishing will be possible—and partly by the construction of a first-class golf links. Now that we are better off, I hope that the development of the Highlands will be more rapid.

The Trade Section.

There are many other exhibits on which I should like to speak. The Horticultural Section is nearly twice as large as last year, thanks largely to the interest of those who grow flowers for sale. The Arts and Crafts Section is excellent as usual, and is of the utmost value to the people. For example, Trengganu exported silk sarongs and cloth to the value of $300,000 in 1936, and white brass to the value of $60,000. This is more than double the export of 1934. The Trade Section is as large as last year notwithstanding the absence of many European firms. I venture to think this abstention is regrettable. A trade exhibit at a Show such as this is nothing less than advertising, and it seems to me that it is precisely in good times that energetic and up-to-date advertising—always important—is of special importance, because it is in good times that new markets are created which will help us through bad times. But, if in asking for more exhibits I am thought to be asking too much, I would at least urge the need for additional members, especially from the estates and firms. The subscription is only $2 a year.

The Association is trying to help Malaya. That it is popular is shown by the numbers who attend its Exhibition. Why not therefore give it practical support by becoming a member?

Malaya at Glasgow.

The Malayan Governments themselves have recognized the need for advertising, and we have just arranged to take space at the Empire Exhibition which is to be held near Glasgow next year. The space reserved will, I believe, be adequate for our needs, and I will say frankly that I want the Malayan section to stand out as the best of all. This is a fine country and we ought to put up a fine show. But there is yet another and a stronger reason. The Exhibition has the interest of the King and it is the first of its kind since His Majesty succeeded to the Throne and a Scottish lady became our Queen. On all counts, therefore, the cause is good.

I am glad to say that the Adviser on Agriculture has kindly consented to be the Chairman of the Committee which has been set up locally to arrange for our exhibits. The time at his disposal is very short—barely six months—and the Committee must therefore be very small so that it can work quickly. Mr. Faulkner and his colleagues have been given practically a free hand, and he asks for the hearty co-operation of all. I am sure he will not ask in vain.

In promoting this Annual Show the Malayan Agri-Horticultural Association is doing most valuable work. It has been proved that, without some central exhibition, local shows tend to die away, and it is largely due to the efforts of the Association that local shows are to-day more numerous and better organized than ever before. On your behalf therefore I offer our sincere thanks to all those who have worked so hard, and have given freely of their time, to make this Exhibition a success.

I have much pleasure in declaring the Exhibition open.

The Exhibition was divided into three main groups: Competitive Sections, Government departmental exhibits, and the Trade Section.

Competitive Sections.

All-Malayan Padi Competition.

The All-Malayan Padi Competition was held for the fourth successive year. The general standard of padi was high; the quality of the fifteen exhibits selected for final judging was higher, it was considered, than in any of the three previous years.

District and State Shows were held at centres during the two or three months preceding the Exhibition as shown in the following table:—

	Local Padi Competitions	District Shows	State Shows
Penang ...	—	1	—
Province Wellesley ...	3	—	—
Perak ...	15	3	1
Selangor ...	1	4	—
Pahang ...	32	6	—
Negri Sembilan ...	1	3	—
Malacca ...	1	2	—
Kelantan ...	—	—	1

The number of exhibits received from each of these States for the Central Competition was as follows:—Penang and Province Wellesley 12 (12), Perak 43 (42), Selangor 17 (16), Pahang 14 (17), Negri Semblian 12 (14), Malacca 11 (11), and Kelantan 3 (2), total 112. Kedah, unfortunately, was unable to send exhibits this year (22). The figures in brackets are for 1936 (total 139).

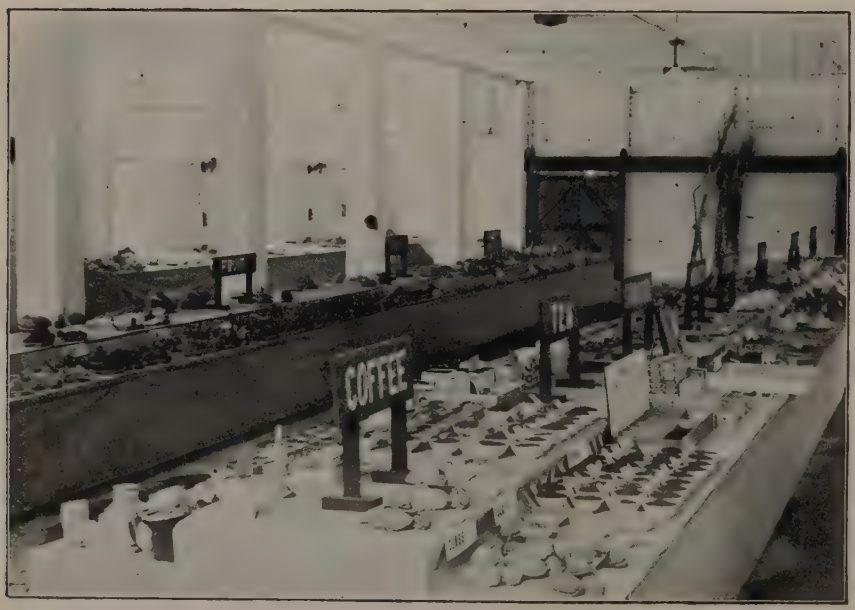
The first process in judging the 112 exhibits was the elimination of those that did not reach a sufficiently high standard of purity and cleanness. This reduced the numbers by half. A few more exhibits were discarded on account of notably under-ripe or unevenly ripened grain.

Types of grain were then considered. Approved types included those of wide popularity for yields and quality of rice, and those with grain of good size, well filled.

The last fifteen selected for the final stage in judging included four samples of Seraup type, four of Siam, four of Radin varieties, two varieties of Nachin and one exhibit of Mayang Sabatil. It is of interest to note that ten of these (2 Seraups, 3 Siams, 4 Radins, 1 Nachin) were Department of Agriculture selected strains.

THE ALL-MALAYAN PADI COMPETITION AND EXHIBITS OF THE DEPARTMENT OF AGRICULTURE.

VIEWS OF THE COMPETITIVE AGRICULTURAL SECTION.



The prizes were awarded as follows:— first prize for a very even and well matured sample of good-sized Seraup type from Labu Ulu, Negri Sembilan; second prize for a very evenly matured sample of Siam 29 from Kuala Pilah, Negri Sembilan; third prize for an exhibit of Seraup 36 from Parit Buntar, Krian. There was considerable difficulty in fixing the final order of these first three prize winners. Fourth prize went to another exhibit of Siam 29, from Kandang, Malacca, which was not quite so evenly ripe as the second-prize winner. Fifth prize was awarded for a sample of Radin Kuning 2 from Raub, Pahang. This was a very good sample but was not considered as good a type as either the Seraups or Siams. The sixth prize went to Rembau, Negri Sembilan, for a fully ripe unselected Siam, with grains somewhat uneven in size.

Five other exhibits require mention. A small-grained Seraup type from Perak was of excellent appearance, but was not better than the two prize-winning Seraups and was considered not quite as good in type. This applies also to two exhibits of Radin Merah (R. 4 and R. 7). Two Mayang Sabatil and Nachin exhibits contained a proportion of imperfectly filled grain, though otherwise of a high standard of quality.

All-Malayan Small Holders' Rubber Competition.

This is the third year that this competition has been held. Organization follows the lines of the Padi Competition, prize-winning exhibits from District Shows being re-judged at the Central Competition held in conjunction with the Exhibition.

Entries were again restricted to smoked sheet only, and each entry consisted of three sheets. A total of 104 entries was received, as follows: Perak 25 (22), Selangor 17 (17), Negri Sembilan 12 (11), Pahang 14 (13), Malacca 7 (6), Province Wellesley and Penang 10 (8), Johore 19 (20). The figures in brackets are the 1936 entries totalling 97.

The judges, officers of the Rubber Research Institute of Malaya, report that the entries were of an even higher standard than last year, and judging was extremely difficult because almost all the entries were of first class quality.

The first prize was awarded to a Chinese at Sabai, Bentong, Pahang, who won the first prize in 1936. The second prize was won by a Malay at Parit, Perak, and the third prize by a Malay at Jementah, Johore. The entry of another Chinese of Sabai, Bentong, was very highly commended.

Agriculture Section.

As mentioned earlier in this report the Agriculture Section was housed in a new permanent building which permitted a very much more attractive and satisfactory display than in former years.

Important changes had been made in the organization of the Section, the most revolutionary being the decision to stage only prize-winning and specially selected first quality exhibits. This change resulted in a much smaller display but enabled

the selected exhibits to be adequately displayed, and made the Section more of a true "exhibition" of agricultural produce, and less of a "collection" as in previous years.

The total number of exhibits accepted by the stewards for judging was 2,186 as compared with 5,397 in 1936.

The reduction of classes in the schedule from 225 to 146 was probably partly responsible for this decline in entries, but the chief reason was the arrival too late for acceptance for judging of a large number of exhibits which had, therefore, to be excluded.

The general standard of quality was higher than in recent years, and once again an outstanding exhibit was the display of produce by the Cameron Highlands Society.

Other Competitive Sections.

The Horticultural Section was an outstanding success, and a particularly attractive innovation was the display of miniature gardens constructed by the various exhibitors in front of the building housing the Section.

The two new permanent buildings which were added in 1936 were employed to house the Preserves and Confectionry, Art and Photography, and Needlework Sections, and the Village Industries and Schools Sections. With the former Sections were included State stalls of Selangor, Kelantan and Trengganu.

It was again unfortunately impossible to hold a Livestock Section owing to the prevalence of disease locally, but a very excellent display of poultry and other birds was to be seen in the Poultry Section. Of particular interest was the fact that for the first time the gold medal for the best bird in the Show was won by a Malay small-holder. The prize-winning bird was the progeny of a bird obtained from the Department of Agriculture, thus showing the results of the work of the Department in this direction.

The Cat Section was held as usual on the third day of the Exhibition but entries, although some reached a high standard, were disappointingly few.

Department of Agriculture, S.S. and F.M.S.

The Department of Agriculture staged an exhibit demonstrating work in progress on padi, pineapple canning, and derris (tuba root).

The stand, which included the All-Malayan Padi Competition, Copra, and Oils and Fats competitive classes, was situated in the main building in front of the new permanent structure allotted to the Agricultural Section. The general arangement of the exhibits was a great improvement over that of past years.

The Rubber Research Institute and Rubber Competition exhibits were situated nearby, and thus all agricultural exhibits for the first time were grouped together.

The padi exhibit consisted of a collection of well-proved selected strains of different varieties from the Experiment Stations at Titi Serong, Krian; Pulau Gadong, Malacca; and Telok Chengai, Kedah. Additional popular varieties were also shown from these districts and from Kelantan, Pahang and Penang on which the Agricultural Department has recently begun selection work.

In the centre of the stand was a diagrammatic representation of the process of cross-pollination, together with a sample of a selected strain of hybrid padi produced by cross-fertilization of high quality Siam 29 with robust Radin 2.

The central item of the pineapple canning exhibit dealt with the proposed Malayan Mark Grading Scheme. A brief description of the Scheme, samples of graded produce, and the chosen design for the Mark, were exhibited.

The demand for pineapple juice is increasing rapidly and an account was displayed of the measures which must be taken to ensure a high-quality product.

The method of testing the quality of the tinplate used in can-making was demonstrated.

Photographs of new factories, designed on model lines, together with views showing the latest methods of cultivation of this crop were also shown.

The derris exhibit had for its main object a comparison of the more important varieties from a commercial standpoint. Living specimens demonstrated the botanical differences between the varieties, while jars containing freshly-rooted cuttings indicated their rooting propensities. Miniature bales of the dried root, similar in shape to those exported, were also exhibited together with specimens of ground root and rotenone. At present, root containing a large percentage of rotenone commands the highest price and a chart was shown giving details of the variations in rotenone content of the varieties of derris exhibited. A leaflet recently issued by the Department giving a general account of this crop in all its aspects was available for distribution.

Departmental publications in English were on sale, and publications in Malay, Chinese and Tamil were distributed.

The Rubber Research Institute of Malaya.

The stand of the Institute was principally occupied with the exhibits in the All-Malayan Rubber Competition, and in addition, photographs of typical aspects of the rubber plantation industry were on view.

The new premises of the Institute, situated near the Exhibition grounds, constituted the main exhibit. A total of 307 visitors inspected the new buildings and were able to see the actual work in progress in the laboratories where special displays of apparatus and specimens were arranged.

Medical Department.

The exhibits staged by the Medical Department were grouped in two main sections: Public Health, sub-divided into two groups—(1) General Sanitation and (2) Anti-Malarial; Maternity and Child Welfare. There were numerous interesting models and posters demonstrating correct as opposed to incorrect methods of procedure in all matters relating to health, and explanations and demonstrations were given by members of the Department.

The total number of visitors in this section was 17,853.

Other Government Departments.

The Posts & Telegraphs Department provided a post office giving all the usual facilities, and also staged several extremely interesting working instruments demonstrating various aspects of the service available in Malaya. An interesting exhibit was a model of the "C" class flying boats of Imperial Airways which will be used on the Malayan air-mail service.

The Federated Malay States Railways shewed the latest type Second Class accommodation and also had on view a large plan depicting the air-conditioned coaches now in use.

The Electrical Department had an attractively designed stall to demonstrate the correct illumination required for a room, together with working models whereby visitors could ascertain the power required for reading purposes.

The Co-operative Societies Department again organized the Village Industries Section and also provided free cinema shows of propaganda films of agricultural interest.

General.

The Trade Section was the smallest for several years, but the stalls were attractively laid out and designed.

The Y.W.C.A. again provided a rest-room for women which was much appreciated.

An Inter-Malay Football Competition was played for the Gold Cup presented by Their Highnesses the Rulers of the Federated Malay States, and a cycling carnival was held in the evenings.

Traffic arrangements and all parking grounds were under the control of the Police, and that Department is to be congratulated on the efficiency of its organization. The Boy Scouts Association again rendered valuable services throughout the Exhibition.

Acknowledgment.

The writer acknowledges with many thanks the assistance given by officers of the Department of Agriculture and of the Rubber Research Institute of Malaya in the compilation of this report.

Reviews.

Insects, Fungi and Bacteria Associated with Copra in Malaya.

By G. H. Corbett, Mohd. Yusope and Abu Hassan and F. S. Ward. Special Bulletin, Scientific Series No. 20. Department of Agriculture, S.S. and F.M.S. 1937. 108 pp. 11 plates. Price 50 cents (Straits Currency) or 1s. 2d. post free.

The first three named authors are responsible for the first—and major section—of this book, dealing with "Insects Associated with Copra in Malaya", while Mr. Ward writes the second section on "Deterioration of Copra caused by Bacteria and Moulds".

The greater portion of the first treatise is concerned with a description of the insects found associated with copra, methods of attack, and in particular, the results of experiments designed to ascertain conditions under which copra is most liable to attack. From these premises the authors draw their recommendations to prevent copra becoming infested with insects, which are, in brief, the uninterrupted drying of the coconut "meat" to a moisture content of about 6 per cent., and the use of sacks that are absolutely free from insects. The incidence of insects is found to be closely connected with mouldy copra, which results from interrupted or incomplete drying.

A study of the moulds and bacteria associated with copra is pertinent to these investigations, and is therefore the subject of the last part of the Bulletin. The combined action of bacteria and penetrating moulds causes copra with a high moisture content to deteriorate rapidly, and, as is shewn earlier, mouldy and broken-down copra forms the food supply of the majority of the insects associated with copra.

D. H. G.

Annual Report of the Drainage and Irrigation Department for the year 1936.

By A. G. Robinson, B.Sc. (Eng.), M.Inst.C.E. Director, Drainage and Irrigation, Straits Settlements, and Adviser, Drainage and Irrigation, Malay States. F.M.S. Government Printing Press, Kuala Lumpur. 143 pp. 45 illustrations, 21 maps and plans. Price $1 or 2s. 4d.

This volume is not merely a report of the activities of the Drainage and Irrigation Department during the year 1936 for it reviews each scheme since its inception and constitutes, therefore, a comprehensive survey of the progress made to date in drainage and irrigation in Malaya.

The report is divided into 10 chapters and 12 appendices, six of the chapters being concerned with irrigation schemes. The inclusion of a List of Contents or an Index would have assisted the reader, for in a report of this size it is somewhat difficult to refer to any particular subject. This, however, is a minor criticism to an extremely interesting and valuable report. In view of the fact that the work of this Department is mostly in the sphere of new problems of engineering science, this report should prove of value to those engaged on similar problems in other countries.

The Department is concerned with irrigation, especially in connexion with rice cultivation; drainage; and river conservancy.

Since many of the important rice-growing areas are remote from public highways, the work of improvement of such areas is little appreciated by the public. Apart from the irrigation schemes designed to open up new and sometimes large areas of land, much work has been carried out during the past few years to improve the water supply to existing areas. This was all the more important because the native method of brushwood dams was leading to excessive silting of the rivers and to considerable damage to the river banks.

The earlier efforts of the Department were to replace the brushwood dams by seasonal dams consisting of concrete aprons upon which piers were built, the river level being raised by means of a series of drop-planks spanning between the piers. More recent improvements have been effected by radial gates in which the pivots and arms are on the upstream side of the gate. In order to reduce the operating time, the design is being further modified by the introduction of balance weights, and the width between piers is also being increased to obviate obstruction of the river flow in flood time.

The work of the Department embraces not only the provision of irrigation schemes, but their maintenance, and the imposing list of completed works given in an appendix is evidence of the amount of routine supervision which devolves on the irrigation engineers.

Perhaps the most striking of the irrigation schemes is that at present in course of construction at Sungei Manik in Perak. An interesting feature of this scheme is that while ultimately it will irrigate an area of about 20,000 acres, it has been planned in stages in such a way that each completed stage becomes a workable unit independently of stages not yet completed.

The great floods in 1926 drew attention to the growing danger of widespread damage caused by the silting up of rivers. The Adviser on Drainage and Irrigation, while recognising the damage, does not attempt to apportion the blame between miners and agriculturists, except in so far as particular present-day cases are considered in which he now not only has to rectify damage done but has to prevent further damage from the source of the trouble. This problem of river conservancy has been solved by several methods, the choice of method depending on local conditions. Briefly, the methods adopted are: prevention of silt pollution by river training and silt control; restoration of silted channels by dredging in the lower reaches; protection against floods by earthen embankments; and snagging.

Before measures were taken by the Department many towns—including Kuala Lumpur and Ipoh—were frequently flooded. The success of the Department in dealing with the flood water is such that in spite of a discharge in excess of that which previously caused severe flooding, no difficulty is now experienced in discharging the water after heavy rains, and the doom which threatened several towns is removed.

One of the most interesting experiments is the training of the river at Bentong, Pahang. Silting had completely filled the bed of the river and the water flowed over a wide area. A river bed was defined by two rows of bamboo stakes from which cross-fencing ran back to dry land, with the object of checking the flow of water and thus inducing it to deposit its silt to form banks to the new channel. This work has been pursued for some years until now 680,000 cubic yards of silt have been deposited creating banks six feet high upon which vegetation is now established. This work at Bentong is unique and is of special importance in its application to the training of rivers heavily charged with mining silt.

In many of the chapters which deal with irrigation in different States, information is given of schemes which have for their object the reclaiming, by bunding, of land which has been rendered useless for agriculture through the deterioration of rivers. There is, for example, the Bachang irrigation area in Malacca, where by bunding and drainage combined an area of 1,500 acres of swampy waste has been rendered fit for rice cultivation. Such instances can be multiplied, the method employed following no rule of thumb.

In the chapter under the title Drainage a new set of conditions is encountered—that of protection of the rich coastal agricultural belt from inundation by sea water.

The construction of bunds and water-gates under these conditions presents its own problems, not least of which has been to prevent leakage through the bund due to boring crabs. The accumulated experience of the Department in the building of bunds which will defeat the crabs and remain effective for years with the minimum of upkeep is recounted concisely in the report, and will repay close study.

The illustrations and plans (the latter in colours) are excellent; their inclusion has obviated the necessity of lengthy explanations.

We review this report from an agricultural point of view, and are impressed by the fact that not only have the efforts of the Drainage and Irrigation Department resulted in making available new land for agricultural development, but by the improvement of the irrigation of the old areas they have made padi planting more attractive to the cultivator—an important factor at such a time as the present, when, owing to general trade recovery, the padi planter on low-yielding areas is apt to be lured to more attractive sources of livelihood.

D. H. G.

Pests of Ornamental Garden-Plants.

By G. Fox Wilson, N.D.H., F.R.E.S., F.L.S., Ministry of Agriculture and Fisheries. Bulletin No. 97, H.M. Stationery Office, London, 1937. 128 pp. 112 figs. Price 3s. 6d. net.

This comprehensive publication deserves, and no doubt will receive, a warm welcome from garden lovers, who will find therein practical advice on the control of the principal pests which attack plants of all kinds in Great Britain. The value of this publication is greatly enhanced by the excellent illustrations which comprise line drafts and photographs. Illustrations such as these, as well as the adequate descriptions, facilitate identification of the pests, an essential preliminary to the application of control measures. Not only insect pests, but other equally important enemies of cultivated plants such as eelworms, slugs and snails, woodlice, millepedes, spider-mites and gall-mites are considered and measures for their control recommended. The subject matter is conveniently arranged under three main headings, namely, control measures, general pests, and pests of the plants growing in particular sections of a garden, for example lawns, rose, herbaceous, and annual borders, rock gardens and in glass houses. Although this bulletin has been compiled mainly for the use of gardeners in a temperate climate, a great deal of the information it contains will be of value to gardeners in Malaya.

N. C. E. M.

Annual Report on the Departments of Agriculture, Malaya, for the year 1936.

By O. T. Faulkner, C.M.G., B.A., Director of Agriculture, Straits Settlements, and Adviser on Agriculture, Malay States. F.M.S. Government Press, Kuala Lumpur, F.M.S., 1937. 81 pp. 1 map. Price $1 (Straits Currency) or 2s. 4d.

The two major sections of this report deal respectively with the general progress of agriculture in Malaya and with the direct results of the efforts of the Department of Agriculture to improve Malayan agriculture. The first section forms a concise statement, supported by statistics of the agricultural industries. The second section summarizes the activities of the Branches and Divisions of the Department. Should the reader wish for a more intricate knowledge of the progress of particular lines of investigation it may be found in the annual reports of the Branches, or in recent published literature of this Department.

The other short sections of the Report are concerned with the Agricultural Advisory Committee, Finance and Legislation.

COST OF MANURING OIL PALMS WITH ROCK PHOSPHATE.

An editorial note on the manuring of oil palms appeared in the July 1937 number of this Journal. The final paragraph of this editorial read as follows:—

> "The Malayan oil palm industry is fortunate if future results confirm that adequate manuring is confined to the application of ground rock phosphate. Christmas Island rock phosphate dust is an inexpensive fertilizer, and, at present prices, the annual bill for the phosphate and cost of applying is not more than about $2 per acre."

The above comment was based on an article which appeared in the same number in which, as a result of experiments described, the authors stated that it appears desirable that the interval between applications of manure should not exceed eighteen months. In other words, the effect of a single application will be felt up to eighteen months after application, and therefore the estimated cost per annum of a single application would be about $2 per annum.

The point must not be forgotten, however, that the effect of an application is not evident immediately; therefore, if it is desired that there shall be no falling off in yield, the next dressing of fertilizer must be applied before the effect of the first dressing is exhausted, to allow for the "lag" before the effect of the manure is apparent.

The question of frequency of application is still the subject of experiment, but doubtless this "lag" will vary according to soil conditions.

It is apparent, therefore, that with a programme of manuring which insures no falling off in yield between one treatment and the next the annual cost of fertilizer will be somewhat higher than the sum stated in the editorial.

PROSPECTUS OF THE SCHOOL OF AGRICULTURE, MALAYA.

A new illustrated edition of the Prospectus of the School of Agriculture, Malaya, has recently been published. Full information is given of the conditions under which students are admitted, scholarships and syllabus of instruction for a two years' and a one year course.

The School has been in existence for six years. The capacity of the school and hostel is limited to eighty students, there being at present sixty-eight in residence as compared with thirty-seven when the School was opened.

The Prospectus points out that "the School does not claim to turn out a 'finished product'. Not only are general rather than specialized courses necessary at present to meet the varying requirements of the students, but facilities do not at present exist for practical instruction in certain directions such as handling of labour. Subject to these limitations, however, the School offers a sound training for those who are genuinely interested in agriculture as a career".

Applications for the Prospectus or for other information concerning the School should be addressed to The Principal, School of Agriculture, Malaya, Serdang, P.O. Sungei Besi, Selangor.

OBITUARY.

Mr. E. A. Curtler, M.A. (Cantab.), Cam. Dip. Agr.

We regret to record the death, at the early age of 42, of Ernest Alfred Curtler. Mr. Curtler had been ill for some months prior to his departure on leave, and died at sea on the 20th July, 1937.

Mr. Curtler was educated at Bristol Grammar School and was a farm pupil when war broke out. He enlisted in the 6th Somerset Light Infantry on 8th August, 1914, and proceeded to France on 15th May, 1915, being gazetted 2nd Lieutenant 1st Somerset Light Infantry on 24th June, 1915. He was wounded in 1917, and demobilized in July, 1919, with the rank of Lieutenant.

Entering St. John's College, Cambridge, in October, 1919, he gained the Diploma in Agriculture in 1920, and graduated B.A. in Economics and Agriculture in 1921.

Mr. Curtler was appointed an Assistant Agriculturist on 22nd November, 1921, and arrived in Malaya during the latter part of December. In June, 1922 he was transferred to the Central Experiment Station, Serdang, and remained there for the next eight years. During this period the Station was being opened from jungle and a great variety of crops established. It was largely due to his conscientious care and attention to detail that this pioneering work was successful.

In 1930, Mr. Curtler was selected by the Director of Agriculture for special duty in Ceylon and India, where he studied the tea industry in preparation for supervising the work with that crop at Cameron Highlands. Subsequently, he was stationed at Tanah Rata, as Assistant Agriculturist, the appointment later being changed to Agricultural Officer, Cameron Highlands; he remained in charge for the next five years until ill health necessitated his departure to England. It is unfortunate that, owing to the International Tea Agreement, full advantage of his work with tea cannot be taken for the present.

Mr. Curtler was a keen volunteer and held the rank of Lieutenant in the Malay States Volunteer Regiment at the time of his death. He had a distinguished record as a Mason, being Past Master of Read Lodge, D.G.St. Bearer, District Grand Lodge, Eastern Archipelago, Past M.E.Z. Selangor Chapter, and Member of Lodge Kinta.

Mr. Curtler was a conscientious and popular officer and the news of his death in the Mediterranean Sea on the way home came as a severe shock to his many friends in Malaya. In bidding him farewell, his colleagues in the Department of Agriculture extend their sincerest sympathy to his wife and children, and to his parents and sister, who mourn his loss.

Mr. Arnold Sharples, A.R.C.Sc., D.I.C.

We regret to record the death of Mr. Arnold Sharples which took place at St. Annes-on-Sea, Lancs., on 6th August 1937.

Mr. Sharples, who at the time of his death was in his fiftieth year, found his career as a mycologist in Malaya, where for 17 years he served in the Department of Agriculture. He then joined the Rubber Research Institute of Malaya as head

of the Pathological Division, and on occasions acted as Director of the Institute.

During the Great War, Mr. Sharples held a commission in the Royal Engineers and saw service in Mesopotamia.

In the field of science Mr. Sharples made a name for himself by his research work on diseases of rubber trees and coconut palms. On his retirement from Malaya in 1933 he devoted his energies to the completion of his book on "Diseases and Pests of the Rubber Tree", which was published in 1936. He has gone from us, but this monument of his work for Malaya will long retain its usefulness and serve as a reminder to those engaged in the rubber industry of his long service in their interests. His friends, and in particular his former colleagues in the Department of Agriculture and the Rubber Research Institute, will need no such reminder of his kindly nature and *bonhomie*. Our sympathy is extended to Mrs. Sharples in her sad bereavement.

JOHORE STATE AGRICULTURAL SHOW.

The fourth Johore State Agricultural Show and Arts and Crafts Exhibition was held at Muar on the 12th and 13th August. The Show, which was officially opened by H.H. The Regent of Johore, was extremely successful, and was visited by over 50,000 persons.

Departmental.

FROM THE DISTRICTS.

Compiled by the Chief Field Officer from Monthly Reports of Agricultural Officers.

August, 1937.

The Weather.

The weather was exceptionally dry generally throughout the inland region of rainfall, total precipitation for the month being below average for all except three of the stations from which records were received. The low rainfall is specially noticeable in respect of Kedah, where normally the precipitation for August is much higher than for July.

The three exceptions are Taiping and Maxwell Hill, where the figures approximated to normal, and Tapah where the rainfall was in excess of the average for the month.

In the west coast region the rainfall was up to average at Port Dickson, was below normal at Malacca, whilst very little rain fell at Muar.

On the east coast the first half of the month was dry but normal rainfall was fairly general during the second half of the month.

Remarks on Crops.

Padi.—The very dry weather seriously delayed planting in Kedah and to a somewhat less extent in Province Wellesley, Krian and Perak generally.

The Panchang Bedena and Tanjong Karang areas in Selangor are as yet too short of water to allow of any start being made to cultivate land for the coming crop. Further progress was made at Panchang Bedena in clearing stumps and timber and some cultivators have prepared nursery plots.

In Kelantan good progress was made with the planting of dry padi lands, and wet padi is planted in the lower areas, but the planting on the higher land awaits further rain. In Malacca the dry weather has resulted in planting dates being later than was expected.

Rubber.—Information in reports from Circles in many parts of the country serves to emphasize that the fact that the small rubber dealers have never concerned themselves with grading the product, is a basic factor concerned in the low premiums they offer for smoked as opposed to unsmoked sheet, or for well prepared as opposed to a poorly prepared product. Thus it is recorded from Penang that the small smoke cabinet owner who takes his product to Georgetown obtains $2.40 a picul more for his smoked sheet than does his neighbour who sells locally. Similarly at Sitiawan in Perak a premium of $3 a picul is paid for smoked sheet as compared with $1 premium paid by small dealers in Dindings. Finally, in the Perak South report it is recorded that the Telok Anson dealers have

combined to make a cut of $7 a picul on rubber from the riverine areas on the grounds that it is very badly prepared. The Agricultural Officer points out that this action in itself will not result in a good product being made, because the dealers living on the banks of the river know nothing of rubber grades. He intimates that as matters stand at present, the small local dealers are unable to give a premium for anything above a grade 4 product, because they are very much in the hands of the larger dealers in Telok Anson.

It is very evident that in many localities the small-holder cannot expect to get a higher premium for better prepared rubber when sold locally, until the local dealers have learnt much more than they at present know of the worth of the various grades of the product. Hence instruction to dealers on grading would seem to be a necessary concomitant of instruction to small-holders on preparing their product, if any real headway is to be made in enabling the small-holder to market his higher-grade product satisfactorily.

A further increase in tapping is reported generally and it is significant in this connexion that, in Kelantan, orders for 150 mangles were received during the month as compared with 60 in June, 66 in July and 49 for the whole of 1936.

Although the market price of the commodity has declined slightly, the prices paid for uncouponed rubber have been maintained or have hardened whilst the price for coupons has declined still further.

Agricultural and Padi Stations.

Agricultural Stations.—There is nothing of special interest to record.

Padi Stations.—The dry weather has prevented any planting being done as yet on any of the Kedah Stations except Jitra and Sala Kanan. Planting has been similarly delayed at Bukit Merah Station in Province Wellesley. At Briah and Selinsing Stations the plants in the nurseries have suffered severely through dry conditions, but work proceeded fairly satisfactorily at the other Stations in Krian. At Panchang Bedena and Tanjong Karang Stations in Selangor sowing has been postponed owing to the very dry conditions obtaining. At Pulau Gadong Station in Malacca planting of the ordinary crop has progressed under difficulties, but the planting of the semi-mechanical area was delayed through dry weather. At Pulau Tawar Station in Pahang dry weather has had a bad effect on the plants in the field. At Kota Bharu Station in Kelantan showery weather hampered the planting of the dry padi, but at Bachok Station the planting of wet padi was delayed by water shortage.

DEPARTMENTAL NOTES.

Visit of H. E. the High Commissioner to the Sungei Manik Irrigation Area.

H.E. The High Commissioner visited the Sungei Manik Padi Experiment Station on the 31st August. There was much activity on the Station at the time, and His Excellency was able to see all stages of padi planting from raft nurseries to the final nursery, in addition to clearing by "tajak".

His Excellency also visited the Sungei Manik Irrigation Area on the same day, by special train, stopping at points of interest on the line.

Rural Lecture Caravan.

The Rural Lecture Caravan toured in Negri Sembilan from the 4th to 13th August, visiting six centres. The shows given were well received and well attended.

Ulu Trengganu District Show.

At the request of the Commissioner of Lands and Mines, Trengganu, the Department of Agriculture staged an exhibit of an educational nature at the Ulu Trengganu District Show held at Kuala Brang on the 18th August. The exhibit comprised a rubber factory and smoke cabinet in operation together with a pen of Rhode Island Red poultry with night ark, day shelter, laying boxes and other accessories of approved type.

Leave.

Mr. N. H. Sands, Agricultural Officer, has been granted 224 days leave from 14th August 1937 to 25th March 1938 inclusive.

Mr. G. E. Mann, M.C., Principal, School of Agriculture, Malaya, has been granted 231 days leave from 14th August 1937 to 2nd April 1938 inclusive. Mr. V. Dawson, Senior Lecturer, will act as Principal during Mr. Mann's absence on leave.

Mr. T. D. Marsh, Agriculturist, has been granted 237 days leave from 2nd September 1937 to 26th April 1938 inclusive.

Dr. T. A. Buckley, Chemist, returned from leave on 5th August 1937.

Mr. F. C. Cooke, Chemist, Coconut Products, returned from leave on the 12th August, 1937, and resumed duty on the 13th August.

Promotions.

Mr. F. Birkinshaw, State Agricultural Officer, Perak, has been promoted to be Chief Field Officer, with effect from 5th August 1937.

Mr. J. N. Milsum, Agriculturist, has been promoted to be Senior Agricultural Officer, with effect from 5th August 1937.

Appointment.

Mr. P. G. J. Dobree, Dip. Agr. (Reading), has been appointed Personal Assistant to the Chief Field Officer, with effect from 1st September 1937.

Statistical.

MARKET PRICES.

August, 1937.

Major Crops.

Rubber.—The market remained steady during the month, with only minor fluctuations. Spot loose opened in Singapore at 29½ cents per lb. and improved to 30¾ cents on the 6th and 7th August; thereafter it weakened but rose again at the end of the month to 30⅛ cents, finally closing at 30 cents.

The average Singapore price for the month for No. 1. X. Rubber Smoked Sheet was 29.94 cents per lb. as compared with 30.72 cents in July. The London average price was 8.82 pence per lb. and the New York price 18.29 cents gold, as compared with 9.15 pence and 18.79 cents gold respectively in July.

Prices paid for small-holders' rubber at three centres during the month are shewn in Table I.

Table I.

Weekly Prices Paid By Local Dealers for Small-Holders' Rubber, August, 1937.

(Dollars per Picul.)

Grades.	Kuala Pilah, Negri Sembilan.				Kuala Kangsar, Perak.			Batu Pahat, Johore.			
	5	12	19	26	4	11	18	4	11	18	25
Smoked sheet	35.80	37.08	36.47	37.00	36.28	36.30	36.00		36.40	35.00	35.70
Unsmoked sheet	34.22	34.15	32.00		34.35	31.00		32.10	32.00	32.00	34.10
Scrap		22.92	21.86								

Transport by F.M.S.R. lorry service Kuala Pilah to Seremban 12 cents per picul, to Malacca excluding duty, 25 cents per picul, by rail Seremban to Penang $1.24 per picul, Seremban to Singapore $8.00 per ton.
Transport from Batu Pahat to Singapore by lorry excluding duty, 90 cents per picul.
Transport from Kuala Kangsar to Prai by railway $6.20 per ton.
Transport from Kuala Kangsar to Singapore by railway $10.00 per ton (minimum consignment 5 tons).
At Kuala Pilah the standard deduction for moisture in unsmoked sheet is 5 per cent.
At Kuala Kangsar the standard deduction for moisture in unsmoked sheet is 10 per cent.
No purchases at Kuala Kangsar on the 25th August.

Palm Oil.—The market fell during August, and prices of the Malayan product are shewn in Table II.

Table II.
Prices of Palm Oil and Palm Kernels.

Date 1937.	Palm Oil in Bulk, c i.f. landed weight Liverpool/ Halifax.	Palm Kernels, c.i.f. landed weight London/ Continent
	per ton	per ton
August 13	£ 22. 10. 0	£ 11. 17. 6
„ 20	21. 10. 0	11. 10. 0
„ 27	20. 10. 0	11. 0. 0

Copra.—The Singapore market remained relatively steady during the first half of the month, but fell heavily in the second half. The sun-dried grade opened at $5.95 per picul and closed at $5.20, the average for the month being $5.69 per picul, and for the mixed quality $5.39, as compared with $5.97 and $5.56 respectively in July.

Copra cake continued unchanged at $2.50 per picul.

Rice.—The average wholesale Singapore prices of rice per picul in July were as follows:— Siam No.2 (Ordinary) $4.08, Rangoon No.1 $3.55, Saigon No.1 $3.72, as compared with $3.91, $3.57 and $3.65 in June, and $3.63, $3.45 and $3.50 in July 1936.

The average retail prices in cents per gantang of No.2 Siam rice in July were: Singapore 28, Penang 36, Malacca 32, as compared with 28, 35 and 30 respectively in June.

The average declared trade value of imports of rice during July was $3.78 per picul as compared with $3.90 in June and $3.88 in May.

Padi.—The Government Rice Mills, Perak, maintained their price at $2 per picul for padi during August. Retail prices of padi ranged from 7 to 17 cents per gantang.

Pineapples.—The market was dull with poor demand and prices per case remained unchanged throughout the month at: G.A.Q.: Cubes $3.05, Sliced Flat $2.95, Sliced Tall $3.10; Golden Quality: $3.35, $3.35 and $3.45 respectively.

Prices of fresh fruit per 100 during August were as follows:— Selangor 60 to 80 cents; Singapore $1 small, $2 large; Johore 1st quality $1.10 to $2.50, 2nd quality 80 cents to $2, 3rd quality 50 cents to $1.50.

Beverages.

Tea.—Six consignments of Malayan tea were sold on the London market during August. Two were of upland tea and averaged 1s. 3d. per lb., while the four consignments of lowland tea averaged 1s. 2½d. per lb.

Average London prices per lb. during August for consignments of tea from other countries were as follows:—Ceylon 1s. 3.63d., Java 1s. 2.25d., Indian Northern 1s. 5.18d., Indian Southern 1s. 2.86d., Sumatra 1s. 0.77d.

The latest Colombo average prices available quoted from *The Weekly Tea Market Report*, 31st August 1937, of the Colombo Brokers' Association, are as follows, in rupee cents per lb.:— High Grown Teas 85 cents, Medium Grown Teas 77 cents, Low Grown Teas 73 cents.

Coffee.—There was a considerable improvement in the Singapore prices of Sourabaya and Palembang coffee during August. The former averaged from $17.45 to $18.45 per picul, and Palembang $13.35 to $14.35. The July ranges were $12 to $14.10 and $10 to $11.25 respectively.

Prices in Singapore of other varieties of coffee were as follows (per picul):— Liberian $17 rising to $18; Excelsa $12; Robusta $10.50 rising to $11, closing at $10.

Arecanuts.—The following was the range of Singapore average prices per picul during August: Splits $5.55 to $7.95; Red Whole $7.55 to $8.75; Sliced $12.90 to $15.70.

The averages of the Singapore Chamber of Commerce quotations per picul were:—Best $8.04, Medium $7.52, Mixed $6.76.

Pepper.—There was very little business done during the month and, with the exception of a slight rise in Singapore Black, prices remained unchanged throughout the month at: Singapore White $16.50, Muntok White $17 per picul; Singapore Black averaged $9.44. The July average prices were $9.25, $16.10 and $16.60 respectively.

Nutmegs.—The price for both 110's and 80's remained unchanged throughout the month at $35 per picul. The July average price was $33 per picul.

Mace.—Siouw was quoted throughout the month at $100 per picul, and Amboina at $85 per picul. The July average prices were $97 and $85.20 per picul respectively.

Cloves.—Quotations continued nominal at $40 per picul for both Zanzibar and Amboina.

Cardamoms.—Quotations for green cardamoms in the August Ceylon Chamber of Commerce reports ranged from Rs. 2.05-Rs. 2.25 to Rs. 2.10-Rs. 2.30, closing at Rs. 2.08-Rs. 2.26 per lb.

Miscellaneous.

Derris (Tuba Root).—The market remained dull during August owing to the continued lack of serious enquiries from consuming countries, and indications are that lower prices may be reached.

Average prices per picul for the month were:—roots sold on rotenone content $42; roots sold on a basis of ether extract $20. July prices were $41 and $22 respectively.

Gambier.—Block was quoted throughout the month at $9.25 per picul, and No. 1 Cube fell from $16 to $15.50 at the close, averaging $15.88 per picul. The July average prices were $9.05 and $16.90 per picul respectively.

Tapioca.—Prices in Singapore weakened during the month, and averages per picul were: Flake Fair $4.82, Seed Pearl $5.29, Medium Pearl $5.60, as compared with $4.96, $5.40 and $5.74 respectively in July.

Sago.—Pearl, Small Fair, remained unchanged throughout the month at $5.25, while Flour, Sarawak Fair, averaged $3.14 per picul. The July average prices were $5.29 and $3.35 per picul respectively.

Tobacco.—The range of prices of dried leaf was as follows:— 1st quality $23 to $47.50, 2nd quality $15 to $42.50, 3rd quality $10 to $28. Prices of prepared tobacco in Kelantan were: $80 to $100, $60 to $85, $35 to $65.

The above prices are based on London and Singapore daily quotations for rubber; on the Singapore Chamber of Commerce Weekly Reports for the month and on other local sources of information. Palm oil reports and certain coffee prices are kindly supplied by Messrs. Guthrie & Co. Ltd., Kuala Lumpur; the Singapore prices for imported coffee and arecanuts by the Lianqui Trading Company of Singapore, and tuba prices by Messrs. Kohyei & Co., Singapore.

1 picul = 133⅓ lbs. The Dollar is fixed at two shillings and fourpence.

Note.—The Department of Agriculture will be pleased to assist planters in finding a market for agricultural produce. Similar assistance is also offered by the Malayan Information Agency, 57 Trafalgar Square, London, W.C. 2

GENERAL RICE SUMMARY*

July, 1937.

Malaya.—Imports of foreign rice during July were 60,488 tons† and exports 7,312 tons, net imports being 53,176 tons as compared with 45,717 tons in 1936. Net imports for the first seven months of the year totalled 317,520 tons as against 306,089 tons in 1936.¶

Of the July imports 47 per cent. were consigned to Singapore, 13 per cent. to Penang, 8 per cent. to Malacca, 24 per cent. to the Federated Malay States, and 8 per cent. to the Unfederated Malay States. The foreign imports by countries of origin were as follows (in tons, percentages in brackets):—Siam 32,187 (53.2), Burma 25,667 (42.4), French Indo-China 1,719 (2.9), other countries 915 (1.5).

Of the July exports 56 per cent. were consigned to the Netherlands Indies, and 44 per cent. to other countries. The various kinds of rice exports were as follows (in tons, percentages in brackets):—Siam 6,290 (86.0), Burma 480 (6.6), French Indo-China 472 (6.4), parboiled 49 (0.7), local production 21 (0.3).

India and Burma.—Foreign exports for the first half-year totalled 587,000 tons as compared with 766,000 tons in 1936, a decrease of 23.4 per cent. Of these exports 4.4 per cent. were to the United Kingdom, 6.5 per cent. to the Continent of Europe, 27.2 per cent. to Ceylon, 23.7 per cent. to the Straits Settlements and the Far East, and 38.2 per cent. to other countries. The corresponding 1936 percentages were 4.2, 20.0, 26.9, 19.0 and 29.9.

Burma's total export of rice and bran (*Bangkok Times*, 6th August, 1937) from 1st January to 29th May aggregated 1,691,196 tons, as compared with 1,682,507 tons in 1936, an increase of 0.5 per cent.

Siam.—Exports of rice and rice products from Bangkok during May were 64,141 tons as compared with 143,885 tons in 1936.

The following report on the 1936 Siam rice crop and the exportable surplus, issued by the Department of Commerce in the Ministry of Economic Affairs, dated 11th August, 1937, states:—

> "With regard to the present export season, circumstances were such that it was was not possible to obtain complete and reliable data on the rice crop. Lack of such data has rendered the calculation of the exportable surplus especially difficult, and so far only one forecast has been issued by this Department. In that forecast the surplus was put at 1,279,109 tons.
>
> It now appears that the damage, as reported to the Department of Agriculture and Fisheries, is much greater than was anticipated. The exportable surplus, therefore, is expected to be considerably lower than the first estimate.
>
> According to the Customs return, the quantity of rice and rice products exported from Bangkok and the southern ports during the first 8 months of the season amounted to about 666,121 tons. If, to this figure, some 20,662 tons exported

* Abridged from the Rice Summary for July 1937, compiled by the Department of Statistics, Straits Settlements and Federated Malay States.

† Ton = long ton (2,240 lbs.)

¶ It is to be understood throughout the summary that all comparisons and percentage increases or decreases are in relation to the corresponding period of 1936.

from the north-eastern frontier are added, the total export will amount to approximately 686,783 tons, or an average of 85,848 tons per month. If the exports during the last 4 months of the season were maintained at this average, the surplus would be 1,030,175 tons. But the increase in the arrivals of paddy and rice at Bangkok since the second half of July and the fact that prices have not risen in an extraordinary manner are indications that a larger supply than was generally expected is still held upcountry, and there is reason to believe that the surplus during this export season will likely be in the neighbourhood of 1,082,323 tons

Japan.—The latest information available was published in the June Summary.

French Indo-China.—Entries of padi into Cholon during January to July totalled 987,852 tons as compared with 1,010,472 tons in 1936, a decrease of 2.2 per cent. Exports of rice during the same period were 902,385 tons as compared with 1,067,945 tons in 1936 a decrease of 15.5 per cent.

The Netherlands Indies.—The latest information available was published in the May Summary.

Ceylon.—Imports during the first seven months of the year totalled 312,144 tons as compared with 312,628 tons in 1936. Of these imports 17.1 per cent. were from British India, 69.5 per cent. from Burma, 0.1 per cent. from the Straits Settlements, and 13.3 per cent. from other countries. The corresponding percentages for 1936 were 13.0, 62.2, 0.2 and 24.6.

Europe and America.—Shipments from the East to Europe from the 1st January to the 9th July totalled 740,688 tons, as compared with 753,857 tons in 1936, a decrease of 1.7 per cent. Of these shipments 46.9 per cent. were from Burma, 45.5 per cent. from Saigon, 5.3 per cent. from Siam, and 2.3 per cent. from Bengal. For 1936 the corresponding percentages were 32.6, 59.0, 7.2 and 1.2.

Shipments to the Levant from 1st January to the 24th June were 10,265 tons as compared with 8,252 tons, an increase of 24.4 per cent.

Shipments for Cuba, West Indies and America from 1st January to 4th July totalled 143,644 tons as compared with 151,752 tons in 1936, a decrease of 5.3 per cent.

MALAYAN AGRICULTURAL EXPORTS, JULY, 1937.

PRODUCT.	Net Exports in Tons				
	Year 1936	Jan.-July 1936	Jan.-July 1937	July 1936	July 1937
Arecanuts ...	26,548	17,334	19,838	2,380	3,002
Coconuts fresh † ...	114,314†	70,135†	53,409†	13,569†	10,991†
Coconut oil ...	46,507	26,530	21,394	3,797	3,374
Copra ...	76,681	32,327	37,753	536	10,180
Gambier, all kinds ...	2,188	1,288	1,133	193	144
Copra cake § ...	20,438§	12,120§	8,020§	2,440§	1,925§
Palm kernels ...	4,964	2,365	3,459	378	691
Palm oil ..	29,296	13,416	22,383	1,891	1,769
Pineapples canned ...	76,403	54,894	55,866	8,689	9,138
Rubber ¶ ...	365,005¶	185,952¶	272,462¶	33.119¶	41,721
Sago,—flour	6,180	3,485	7,572	1,038	725*
,, —pearl ...	3,319	1,874	1,722	240	251
,, —raw ...	7,484*	4,127*	4,473*	196*	588*
Tapioca,—flake ...	1,535	1,002	652	108	58
,, —flour ...	2,418*	1,169*	1,066*	187*	211*
,, —pearl ...	17,797	9,330	8,467	1,402	6
Tuba root ...	599	405	386	47	62

† hundreds in number. * net imports. ¶ production. § gross exports.

MALAYAN PRODUCTION OF PALM OIL AND KERNELS

(In long tons, as declared by Estates)

Month 1937	Palm Oil		Palm Kernels	
	F.M.S.	U.M.S.	F.M.S.	U.M.S.
January ...	1,984.8	865.0	360.4	156.0
February ...	1,759.6	1,851.8	323.6	308.7
March ...	1,798.4	1,473.4	358.7	256.1
April ...	1,573.1	1,237.2	308.0	226.0
May ...	1,587.6	1,285.2	257.8	186.4
June ...	1,671.8	1,611.7	288.9	252.5
July ...	2,651.0	1,860.5	411.6	269.6
Total ...	13,026.3	10,184.8	2,309.0	1,655.3
Total January to July, 1936 ...	11,390.3	3,959.0	1,888.4	622.9
Total for the year 1936 ...	23,081.2	8,812.3	3,791.0	1,340.7

Stocks on estates at the 31st July, 1937 were: palm oil 2,422.9 tons; palm kernels 639.9 tons.

ACREAGES OF TAPPABLE RUBBER ACTUALLY TAPPED AND NOT TAPPED ON ESTATES OF 100 ACRES AND OVER, FOR THE MONTH ENDING 31ST JULY, 1937.

STATE OR TERRITORY	Estimated Acreages of Tappable Rubber	Actual area tapped during the month Acreage	Percentage of (3) to (2)	ACREAGES OF TAPPABLE RUBBER NOT TAPPED				AREA OF TAPPABLE RUBBER NEVER BEEN TAPPED		Total area not tapped (5) + (7)	Percentage of (11) to (2)
				ESTATES WHICH HAVE ENTIRELY CEASED TAPPING		ESTATES WHICH HAVE PARTLY CEASED TAPPING (a)					
				Acreage	Percentage of (5) to (2)	Acreage	Percentage of (7) to (2)	Acreage	Percentage of (9) to (2)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
STRAITS SETTLEMENTS :—											
Province Wellesley ...	43,757	27,100	61.9	338	0.8	16,319	37.3	348	0.8	16,657	38.1
Malacca ...	123,576	84,220	68.2	512	0.4	38,844	31.4	2,943	2.4	39,356	31.8
Penang Island ...	2,591	1,809	69.8	—	—	782	30.2	75	2.9	782	30.2
Singapore Island ...	32,582	22,054	67.7	973	3.0	9,555	29.3	119	0.4	10,528	32.3
Total S.S. ...	202,506	135,183	66.8	1,823	0.9	65,500	32.3	3,485	1.7	67,323	33.2
FEDERATED MALAY STATES :—											
Perak ...	291,814	219,836	75.3	1,064	0.4	70,914	24.3	7,875	2.7	71,978	24.7
Selangor ...	333,865	250,340	75.0	4,103	1.2	79,422	23.8	11,414	3.4	83,525	25.0
Negri Sembilan ...	259,223	187,043	72.2	2,360	0.9	69,820	26.9	10,256	4.0	72,180	27.8
Pahang ...	84,062	60,415	71.9	4,180	5.0	19,467	23.1	10,572	12.6	23,647	28.1
Total F.M.S. ...	968,964	717,634	74.1	11,707	1.2	239,623	24.7	40,117	4.1	251,330	25.9
UNFEDERATED MALAY STATES :—											
Johore ...	468,381	344,728	73.6	4,561	1.0	119,092	25.4	39,581	8.5	123,653	26.4
Kedah ...	203,750	149,973	73.6	3,836	1.9	49,941	24.5	8,215	4.0	53,777	26.4
Kelantan ...	28,412	22,040	77.6	403	1.4	5,969	21.0	3,048	10.7	6,372	22.4
Trengganu (b) ...	4,817	3,044	63.2	—	—	1,773	36.8	100	2.1	1,773	36.8
Perlis ...	1,330	651	48.9	482	36.3	197	14.8	107	8.0	679	51.1
Brunei ...	5,584	3,566	63.9	1,090	19.5	928	16.6	821	14.7	2,018	36.1
Total U.M.S. ...	712,274	524,002	73.6	10,372	1.4	177,900	25.0	51,872	7.3	188,272	26.4
Total Malaya ...	1,883,744	1,376,819	73.1	23,902	1.3	483,023	25.6	95,474	5.1	506,925	26.9

Notes :—(a) Area out of tapping on estates which have partly ceased tapping refers to areas definitely being rested and includes areas rested under rotational systems, but excludes areas on any tapping round in respect of Perlis only.

(b) Registered companies only.

MALAYAN RUBBER STATISTICS

TABLE I

STOCKS, PRODUCTION, IMPORTS AND EXPORTS OF RUBBER, INCLUDING LATEX, CONCENTRATED LATEX AND REVERTEX, FOR THE MONTH OF JULY, 1937, IN DRY TONS.

State or Territory	Stocks at beginning of month 1			Production by Estates of 100 acres and over		Production by Estates of less than 100 acres estimated 2		Imports				Exports including re-exports				Stocks at end of month			Consumption 3	
								during the month		Jan. to July 1937		during the month		Jan. to July 1937						
	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to July 1937	during the month	Jan. to July 1937	Foreign	From Malay States & Labuan	Foreign	From Malay States & Labuan	Foreign	Local	Foreign	Local	Ports	Dealers	Estates of 100 acres and over	during the month	Jan. to July 1937
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
MALAY STATES :—																				
Federated Malay States ...	...	12,838	14,088	14,749	91,843	7,691	47,430	Nil	Nil	Nil	Nil	17,492	7,976	97,619	35,907	...	9,608	14,276	14	113
Johore ...	...	4,236	4,986	6,514	39,707	3,570	27,693	Nil	54	Nil	2,230	3,802	6,761	22,442	45,257	...	3,172	5,625	...	...
Kedah ...	...	972	3,368	3,680	22,245	1,045	8,391	Nil	Nil	Nil	Nil	2,490	2,395	14,710	15,664	...	668	3,512	...	...
Kelantan ...	...	28	10	15	93	18	159	Nil	Nil	Nil	Nil	Nil	30	Nil	233	...	28	13	...	...
Trengganu ...	...	1,293	317	408	2,531	288	5,230	Nil	Nil	Nil	Nil	364	683	2,062	4,924	...	917	342	...	...
Brunei ...	...	55	50	253	1,896	127	949	Nil	Nil	Nil	Nil	Nil	380	Nil	2,845	...	55	50	...	...
Total Malay States	...	1	60	67	409	71	575	...	...	...	...	...	137	...	968	...	8	54	...	...
	...	19,423	22,879	25,686	158,724	12,810	90,427	Nil	54	Nil	2,230	24,148	18,362	136,833	105,798	...	14,456	23,872	14	113
S. SETTLEMENTS :—																				
Malacca ...	...	2,218	1,086	1,573	9,511	543	4,978	Nil		Nil		3,213		20,536		...	1,618	1,209	...	...
Province Wellesley	...	1,973	725	623	3,699	144	1,833	Nil		Nil		12,037		57,848		...	1,123	725	...	...
Penang ...	3,116	5,571	11	24	123	53	814	3,122	15,893	21,797	101,445		Nil		Nil	2,271	4,619	13	...	...
Singapore ...	5,156	31,242	187	220	1,226	40	1,005	22,902		112,634		32,465		160,522		8,469	29,417	229	33	215
Labuan ...	...	43	Nil	Nil	Nil	5	122	76		352		Nil		Nil		...	25	Nil	...	...
Total Straits Settlements ...	8,272	41,047	2,009	2,440	14,559	785	8,752	26,100	15,893	134,783	101,445	47,715	Nil	238,906	Nil	10,740	36,802	2,176	33	215
Total Malaya ...	8,272	60,470	24,888	28,126	173,283	13,595	99,179	26,100	15,947	134,783	103,675	71,863	18,362	375,739	105,798	10,740	51,258	26,048	47	328

TABLE II
DEALERS' STOCKS, IN DRY TONS 3

Class of Rubber	Federated Malay States	S'pore	Penang	Province We'sly D'dings M'cca.	Johore	Kedah
22	23	24	25	26	27	28
DRY RUBBER	7,494	27,197	4,373	2,541	2,369	219
WET RUBBER	2,114	2,220	246	233	803	449
TOTAL ...	9,608	29,417	4,619	2,774	3,172	668

TABLE III
FOREIGN EXPORTS

PORTS	For month	Jan. to July 1937
29	30	31
Singapore ...	47,202	248,757
Penang ...	18,225	88,407
Port Swettenham.	6,158	36,975
Malacca ...	278	1,600
MALAYA ...	71,863	375,739

TABLE IV
DOMESTIC EXPORTS 4

AREA	For month	Jan. to July 1937
32	33	34
Malay States ...	42,456	240,404
Straits Settlements	4,041	23,164
MALAYA ...	46,497	263,568

Notes :—

1. Stocks on estates of less than 100 acres and stocks in transit on rail, road or local steamer are not ascertained.
2. The production of estates of less than 100 acres is estimated from the formula : Production + Imports + Stocks at beginning of month = Exports + Stocks at end of month, + Consumption, *i.e.*, Column [7] = Columns [13] + [14] + [17] + [18] + [19] + [20] − [2] − [3] − [4] − [5] − [9] − [10]. For the Straits Settlements the production of estates of less than 100 acres is represented by sales or exports as shown by cess paid.
3. Dealers' stocks in the Federated Malay States are reduced to dry weights by the following fixed ratios: unsmoked sheet, 15% wet sheet, 25% scrap, lump, etc., 40%; stocks elsewhere are in dry weights as reported by the dealers themselves.
4. Columns (33) and (34) represent exports of rubber subject to regulation which, for Singapore and Penang Islands are represented by sales or exports as shown by cess paid.
5. All statements are brought up to date monthly, and any inaccuracies that may be disclosed are corrected in the totals; the latest publication, therefore, is always the most reliable.
6. The above, with certain omissions, is the Report published by the Registrar-General of Statistics, S.S and F.M.S., at Singapore on 24th August, 1937

METEOROLOGICAL SUMMARY, MALAYA, JULY, 1937.

Locality.	Air Temperature in degrees Fahrenheit							Earth Temperature		Rainfall								Bright Sunshine.		
	Means of			Absolute Extremes						Total.		Most in a day.	Number of days.					Total.	Daily Mean.	Per cent.
	A. Max.	B. Min.	Mean of A and B	Highest Max.	Lowest Min.	Lowest Max.	Highest Min.	At 1 foot	At 4 feet			Amt.	Precipitation .01 in or more	Precipitation, .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more			
	°F	°F	°F	°F	°F	°F	°F	°F	°F	in.	mm.	in.						hrs.	hrs.	
Railway Hill, Kuala Lumpur, Selangor ...	89.7	71.5	80.6	95	69	84	74	83.3	84.7	2.78	70.6	1.37	12	7	1			172.50	5.56	45
Bukit Jeram, Selangor ...	89.2	72.6	80.9	92	70	85	76	85.3	87.1	2.38	60.5	0.62	12	8			1	202.80	6.54	53
Sitiawan, Perak ...	89.8	72.9	81.3	93	71	87	75	84.4	85.2	3.35	85.1	0.92	13	9				219.25	7.07	57
Temerloh, Pahang ...	89.2	71.9	80.5	92	68	83	74	85.2	86.3	2.35	59.7	1.40	8	6	1	6		179.95	5.80	47
Kuala Lipis, Pahang ...	88.5	71.5	80.0	92	69	84	74	84.2	85.0	2.36	59.9	0.67	8	8	2	24		174.45	5.63	46
Kuala Pahang, Pahang ...	86.6	74.1	80.3	90	71	82	76	86.2	87.4	5.15	130.8	1.45	10	8			1	216.65	6.99	57
Kallang Aerodrome, S'pore ...	85.9	78.2	82.1	88	73	79	82	82.6	83.6	2.87	72.9	1.33	13	10				223.60	7.21	59
Butterworth, Province Wellesley ...	87.5	74.4	80.9	89	71	85	81	84.9	86.0	3.58	90.9	0.87	11	10	1			191.75	6.19	50
Bayan Lepas Aerodrome Penang ...	87.0	74.3	80.7	89	70	84	79	83.8	85.0	8.68	220.5	3.61	16	11	3			187.65	6.05	49
Bukit China, Malacca ...	85.0	74.0	79.5	88	71	80	78	82.4	83.9	9.19	233.4	5.60	17	13	1		3	186.75	6.02	49
Kluang, Johore ...	87.3	71.0	79.1	91	67	78	74	81.2	82.5	4.08	103.6	1.00	13	10	3	5		189.80	6.12	50
Bukit Lalang, Mersing, Johore	87.0	71.6	79.3	91	70	76	73	81.9	82.2	4.92	125.0	0.85	19	12	2		3	200.85	6.48	53
Alor Star, Kedah ...	87.9	73.8	80.9	90	71	80	77	84.2	86.0	3.32	84.3	1.03	11	11			2	192.25	6.20	50
Kota Bahru, Kelantan ...	89.5	73.6	81.5	92	71	86	76	84.9	85.6	3.75	95.3	0.99	18	13	4			196.30	6.33	51
Kuala Trengganu, Trengganu	88.3	73.3	80.8	92	70	81	76	83.2	84.8	8.57	217.7	2.25	12	10	7			191.45	6.17	50
HILL STATIONS.																				
Fraser's Hill, Pahang 4268 ft.	74.3	62.4	68.3	77	60	69	64	72.2	72.9	5.92	150.4	2.35	10	9	1	20	1	163.40	5.27	43
Cameron Highlands, Tanah Rata, Pahang 4750 ft. ...	72.9	55.5	64.2	77	48	69	61	70.5	70.6	1.71	43.4	0.43	10	10		3		158.20	5.10	41
Cameron Highlands, Rhododendron Hill, Pahang 5120 ft. ...	71.9	59.4	65.6	76	54	67	64			1.74	44.2	0.51	11	11		3	2	164.45	5.30	43

Compiled from Returns supplied by the Meteorological Branch, Malaya.